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BAKKER (MARTHA). **Bacterievlekkenziekte in Bloemkool en andere Koolsoorten, veroorzaakt door Pseudomonas maculicola (McCulloch) Stevens.** [Bacterial spot disease of Cauliflower and other *Brassica* species caused by *Pseudomonas maculicola* (McCulloch) Stevens.]—*Tijdschr. PlZiekt.*, 57, 3, pp. 75–81, 6 figs., 1951. [English summary.]

During the abnormally wet summer of 1950 cauliflower, cabbage, and Brussels sprouts were attacked throughout Holland by *Pseudomonas maculicola* [*R.A.M.*, 15, p. 696 *et passim*], and in this connexion the author summarizes some useful information on the symptomatology, geographical distribution, and control of the leaf spot, and the morphological and physiological characters of the causal organism. Appreciable damage was sustained only by cauliflowers. Inoculation experiments with isolates of the pathogen gave positive results on cauliflower and white cabbage seedlings. There are no authentic previous reports of the disease in Holland, but there is believed to be no doubt of its presence in a less prominent form in earlier years.

KASAI (T.). **Transmission of the mosaic disease of Japanese Radish by Myzus persicae Sulz.**—*Ann. phytopath. Soc. Japan*, 15, 1, pp. 3–6, 1950. [Japanese, with English summary.]

Single non-viruliferous aphids of *Myzus persicae* acquired the mosaic virus of Japanese radish [cf. *R.A.M.*, 31, p. 43] by feeding for five minutes on diseased plants, while viruliferous individuals infected healthy plants on which they fed for the same period. The aphids retained the capacity to transmit the virus for three but not for five hours. Infectivity ceased within 30 minutes during feeding on healthy plants or one hour on an immune species, such as tobacco. The efficiency of the vectors was greatly enhanced by one hour's starvation prior to five minutes' infective feeding, followed immediately by transference to healthy plants. No infection was caused by inoculation with extract of macerated aphids collected on diseased plants. The virus did not appear to be transmissible from viruliferous aphids to their progeny. The evidence from those experiments denotes that the Japanese radish mosaic virus belongs to the non-persistent class [ibid., 19, p. 562 *et passim*].

KLINKOWSKI (M.) & SCHMELZER (K.). **Das Gelbnetzvirus der Betarübe, eine bisher in Deutschland noch nicht beobachtete Viruskrankheit.** [The yellow-net virus of the Beetroot, a virus disease not hitherto observed in Germany.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., 5, 2, pp. 21–24, 4 figs., 1951.

The symptoms of a beet disease observed in central Germany for the first time during the late summer of 1950 agreed with those of the yellow-net virus occurring in the United States [*R.A.M.*, 30, p. 209] and a similar or identical condition described from Belgium under the name of vein-yellowing [ibid., 28, p. 202]. The designation 'yellow-net virus' is proposed for the German disease.

KENNEDY (J. S.). **Benefits to aphids from feeding on galled and virus-infected leaves.**—*Nature, Lond.*, 168, 4280, pp. 825–826, 2 graphs, 1951.

In experiments at the Agricultural Research Council Unit of Insect Physiology, Cambridge, free and caged populations of *Aphis fabae*, fed on sugar beets affected by the mosaic virus disease [*R.A.M.*, 28, p. 432], grew distinctly faster on diseased whole plants than on healthy ones, and overcrowding and emigration also began sooner. The average output of young per mother caged on leaves with mosaic symptoms (systemically infected, following sap-inoculation of the plants 11 to 240 days before the experiment) was higher than on healthy leaves in 12 out of 13 experiments with leaves still growing, in eight out of nine on mature leaves, and in three out of three on ageing ones. The disease evidently renders the whole plant, not merely the mature leaves, more suitable for this vector.

VENKATAKRISHNAIYA (N. S.). **The perithecial stage of Erysiphe polygoni DC. on Pea (Pisum sativum Linn.).**—*Curr. Sci.*, 20, 5, pp. 137–138, 1951.

The perithecial stage of *Erysiphe polygoni* is of rare occurrence in India. Butler and Bisby [*R.A.M.*, 11, p. 545] reported material of the perfect state, mostly originating in the north. On 26th July, 1950, perithecia were detected on both surfaces of severely infected leaves of a three-month-old field crop of peas near Bangalore, Madras, where rain during the previous week had been continuous. The maximum and minimum temperatures during the fortnight preceding the observation were 82·4° and 63·8° F., respectively, and those for the two subsequent weeks 84·5° and 64·8°, respectively. During July the relative humidity ranged from 76 to 95 per cent.

The dimensions of the Mysore isolate appear to correspond to those of Blumer's mid-European strain [ibid., 13, p. 127] rather than Butler's (Fungi and disease in plants, pp. 253–254, 1918) [cf. *R.A.M.*, 29, p. 319].

OOSTENBRINK (M.). **Het Erwtencystenaaltje, Heterodera göttingiana Liebscher, in Nederland.** [The Pea cyst eelworm, *Heterodera göttingiana* Liebscher, in Holland.]—*Tijdschr. PlZiekt.*, 57, 2, pp. 52–64, 3 figs., 1951. [English summary.]

Included in this study on the history, biology, symptomatology, host range, and control of *Heterodera göttingiana* on peas in Holland is a discussion of its relation to the so-called 'St. John's disease', associated with *Fusarium* spp. [*R.A.M.*, 13, p. 612; cf. also ibid., 30, p. 501]. The writer is of opinion that the nematode is the primary agent of the disease, the connexion of soil fungi with which is purely subsidiary. The name 'St. John's disease' should therefore be relinquished in favour of 'pea cyst eelworm' or 'cyst eelworm in peas'.

HAGEDORN (D. J.) & HANSON (E. W.). **A comparative study of the viruses causing Wisconsin Pea stunt and Clover vein mosaic.**—*Phytopathology*, 41, 9, pp. 813–819, 3 figs., 1951.

This is an amplified version of the authors' comparative study of the viruses responsible for Wisconsin pea stunt and red clover vein mosaic, a preliminary note on the identity of which has already appeared [*R.A.M.*, 30, p. 419]. On the average 24° C. was the most favourable temperature for symptom expression, but in general, infection developed throughout the range from 16° to 28°, though more slowly at the lower limit. The same plants served as hosts of both viruses, viz., garden pea, sweet pea, crimson, red, alsike, and white clovers, white sweet clover [*Melilotus alba*], and broad bean. Ten pea varieties were susceptible to infection by the two viruses, the symptoms induced by which were indistinguishable. Both remained infective after dilution at 1 in 1,000 but not at 1 in 100,000, they

succumbed to two or three days' ageing *in vitro* at 20°, and were inactivated by ten minutes' exposure to 60°. Transmission by the pea aphid (*Illinoia* [*Macrosiphum*] *pisi*) resulted in 40 per cent. infection by pea stunt and 66 per cent. by red clover vein mosaic virus.

VENKATAKRISHNAIYA (N. S.). **Phytophthora parasitica on French Bean Phaseolus vulgaris Linn.**—*Indian J. agric. Sci.*, 20, 3, pp. 391–394, 2 pl., 1950.

A *Phytophthora* sp. agreeing generally in morphological, cultural, and pathogenic characters with *P. parasitica* [cf. *R.A.M.*, 18, p. 742] was isolated from young green French bean pods presenting a water-soaked appearance after heavy rain. The disease occurred in low-lying fields in Bangalore, India, during August, 1945, and October, 1946. It was controlled by picking all infected pods and spraying the plants with 1 per cent. Bordeaux mixture.

PAYAK (M. M.). **A Synchytrium disease of Udid Beans.**—*Curr. Sci.*, 20, 4, pp. 103–104, 1 fig., 1951.

The lower leaves of *Phaseolus mungo* plants in a garden near Poona, India, were found in October, 1950, to be severely parasitized by a new species of *Synchytrium* [cf. *R.A.M.*, 28, p. 559], *S. ajrekari*, with spherical, golden-brown hypnospores, 114 to 266 μ in diameter, having walls 8 to 11·5 μ thick. The galls on the leaves, which were shaded from the sun, were amphigenous, mostly simple, and like minute tubercles.

NEWHALL (A. G.) & GUNKEL (W. W.). **A duster for row application of fungicide and/or insecticide at the time of sowing seeds.**—*Plant Dis. Reptr*, 35, 4, pp. 219–220, 2 figs., 1951. [Multilithed.]

A root rotary hand duster [*R.A.M.*, 31, p. 4] used in the 1950 trials for the control of onion smut [*Urocystis cepulae*: ibid., 30, p. 312] on New York muckland soils is described and figured. The following fungicide mixtures gave rather good control of smut on 20 farms at 20 to 30 lb. per acre: thiram-pyrax (1:1), tersan-pyrax (1:1), tersan-insecticide (1:4), and orthocide-pyrax (1:1). Application of the tersan-insecticide, even at 30 lb. per acre, used only 3 lb. active thiram per seven miles of row.

La bigarrure jaune de l'Oignon. [Yellow streak of Onions.]—*Progr. agric. vitic.*, 136, 30, pp. 71–73, 1951.

This is a reproduction in full of a recent popular publication of the French Ministry of Agriculture on a serious disease of seed onions in eastern France termed yellow streak [onion yellow dwarf: *R.A.M.*, 19, p. 511], with introductory remarks by P. BERNAUX. Losses may attain 50 per cent. or even more in unfavourable years, threatening the future production of seed in this area. In Auxonne, where onions are grown chiefly for consumption, large bulbs are damaged during winter storage.

ARX (J. A. v.). **De Phomopsisziekte van Zaadwortelen.** [The *Phomopsis* disease of seed Carrots.]—*Tijdschr. PlZiekt.*, 57, 2, pp. 44–51, 3 figs., 1951. [English summary.]

A full account is given of the author's investigation in the spring of 1949 on a disease of seed carrots in Holland caused by *Phomopsis dauci* n.sp. Infection occurs in the second year, entry being gained in 95 per cent. of the cases observed through the flower buds or already open flowers and in the remainder directly through the stem, near the leaf bases, where insect injuries probably serve as places of entry. The spores penetrate readily the tender floral tissues, fluid secretions from the

stigmas being an aid to rapid germination and infection. After an incubation period of four to six days the petals turn brown and droop, and the fungus then grows rapidly through the pedicel, discolouring and killing the entire umbel. On reaching the foot it invades adjacent pedicels and travels down the inflorescence stalk.

P. dauci is a perthophyte [*R.A.M.*, 9, p. 47], forming destructive toxins, which rapidly traverse the vascular bundles and kill them and the adjacent tissues. In this way the pathogen daily extends its range by 6 to 10 mm. The necrotic portions first turn dark reddish-brown, then grey or brownish, often of a rather pale shade. Three to four weeks later the pycnidia appear as black dots, regularly distributed over a large part or the whole of the stem and the stalks of the umbels. Spread into the lateral branches of the stem is not extensive, since they soon wilt.

P. dauci grows at the rate of 7 to 11 mm. per diem on cherry or potato agar plates. Older cultures, especially on potato agar, form a green pigment which diffuses through the medium. The sparse aerial mycelium may either remain white or develop a yellow-green or orange to grey-brown tinge. The greenish, later dark brown, submerged hyphae average 6 to 9 μ in diameter as against 1 to 3 μ for the aerial. Pycnidia are produced only after three to five months. Inoculation experiments through wounds in the flowering stems of five cultivated varieties (three summer and two winter) resulted in the development of typical symptoms. The fungus overwinters in the dead stems and infects the new flowering plants by means of its α-conidia in the following summer. After harvesting, therefore, the plants should be removed and destroyed.

The pycnidia are mostly solitary, subepidermal or innate, depressed-ellipsoid or rarely globose, often more or less irregular, provided with a flat, conical, or cylindrical to conical ostiole, and 200 to 360 μ in diameter and 90 to 140 μ in height. The thick, membranous walls are composed of cells 4 to 8 μ in diameter, of a translucent olivaceous or very dark brown colour, gradually becoming paler towards the interior. The straight or slightly curved, oblong to fusoid, continuous, hyaline α-conidia, tapering and obtuse at both ends, measure 7 to 12 by 2 to 4 μ. The β-conidia are filiform, more or less curved, often falcate, S-shaped, or geniculate at one end, hyaline, and measure 18 to 28 by 0·6 to 1 μ. The α-conidia are borne on rod-shaped to subulate, simple conidiophores, 12 to 18 μ in length, 1·5 to 2·5 μ at the base, while those supporting the β-conidia are narrow cylindrical, and 4 to 10 μ long.

YERKES (W. D.), SHAW (C. G.), & FISCHER (G. W.). **Spinach smut, Entyloma ellisii Halsted, a new record for Washington State.**—*Phytopathology*, 41, 9, pp. 854–856, 1 fig., 1951.

The routine examination of spinach leaves in Washington for oospores of mildew (*Peronospora farinosa*) [*P. effusa*: *R.A.M.*, 29, p. 454] in April, 1950, disclosed spores in irregular, marginal, necrotic lesions suggestive of *Entyloma ellisii* [ibid., 12, p. 335]. They were pale brown and measured 10 to 14 μ in diameter but lacked the thick, gelatinous sheaths characteristic of Halsted's type material, described in *Bull. Torrey bot. Cl.*, 17, pp. 95–97, 1890. Further examination, however, revealed in interveinal, faintly chlorotic lesions, only 1 to 2 mm. in diameter, hyaline spores more closely resembling those of the type species, 15 to 34 μ in diameter and furnished with gelatinous walls, 1·3 to 2 μ in thickness. The pale brown, thin-walled spores are regarded as mature and the hyaline, thick-walled ones immature; the average spore diameters of the Washington and the type material are in reasonably close agreement (19·3 and 22·1 μ, respectively).

It is considered likely that the smut may have been present in trace amounts in the field ever since its original discovery, escaping notice owing to the inconspicuous character of the lesions.

Vanderwalle (R.) & Parmentier (G.). **Une maladie de la Chicorée (Cichorium intybus) causée par Verticillium dahliae Kleb.** [A disease of Chicory (*Cichorium intybus*) caused by *Verticillium dahliae* Kleb.]—*Parasitica*, 7, 2, pp. 69–76, 1951.

Verticillium dahliae was first reported on chicory in Belgium in 1935 [*R.A.M.*, 15, p. 387], after which the disease occurred only occasionally until a few years later, when similar but more severe symptoms were observed. In the field they appeared on the leaves about the end of June, were very marked in July, and reached their peak in August and September. At first a slight interveinal chlorosis appeared on the older leaves on the upper part of the stem. This was followed rapidly by yellowing travelling to the base, and finally necrosis of the yellow tissues. The chlorosis continues imperceptibly, leaving the leaf with only the main veins still green. The browning is at first localized in parallel bands and then affects the whole leaf, which withers and falls. Only the outer leaves are affected. Diseased plants generally have a longer collar than healthy ones because of the greater number of leaf scars. The vascular system in affected roots was occluded by gum and tyloses and abnormally lignified. At forcing time affected roots did not develop normally and the central shoot seemed weakened or was dead, thus causing the production of numerous lateral shoots.

The leaf symptoms were considered to be the most characteristic sign of the disease, as *V. dahliae* was isolated from such plants more frequently than from those with discoloured roots, although in 1947 it was secured from diseased roots. Leaf symptoms developed on healthy plants two months after being planted in inoculated soil. It was concluded that root browning depends to a great extent on certain soil factors which are not always present. The percentage of diseased plants increased in the field according to climatic and soil conditions. In general the disease was favoured by dampness. Variations in disease reaction of certain varieties offers some hope of control by the selection of resistant ones.

Van Hoof (H. A.). **Disease of Groundnut caused by Cercospora personata (B. & C.) E. & E. and Cercospora arachidicola Hori.**—*Contr. gen. agric. Res. Sta., Bogor*, 114, 17 pp., 2 figs., 1950. [Indonesian summary.]

Prior to the investigations herein reported, only *Cercospora personata* had been observed on groundnuts in Indonesia [C.M.I. map No. 152], but *C. arachidicola* [ibid., No. 166] also has now been found to be widespread. Some important contributions to the literature on the influence of climatic conditions on the disease [*R.A.M.*, 15, p. 284], varietal resistance [ibid., 15, p. 277; 17, p. 651; 20, pp. 443, 448; 27, p. 80], and control [ibid., 18, p. 433; 20, p. 290; 21, p. 65; 26, p. 181, *et passim*] are reviewed.

At Bogor, Java, infection by either species usually develops 40 to 50 days after planting, but at the close of the dry monsoon about 70 days elapse before it begins. Four foliar applications of 1 per cent. Bordeaux mixture at fortnightly intervals gave effective control, increasing the yields of dry pods and foliage by 0·2 and 10·5 quint. per ha., respectively, over the untreated. Copper oxide (0·5 per cent. perenox), copper oxychloride (0·5 per cent. koperkalk wieko) [ibid., 31, p. 86], and 0·2 per cent. AA922 [loc. cit.], also proved effective, increasing the dry pod yields by 1·5, 0·7, and 2·2 and those of the foliage by 8·4, 8·4, and 10·8 quint. per ha., respectively. These preparations, however, require further testing. Used on the soil, 1 per cent. Bordeaux failed to control the pathogens, while sulphur sprays and dusts were likewise ineffectual [ibid., 25, p. 48].

Cooley (J. S.) & Kushman (L. J.). **Effect of pasteurization on black rot of Sweet Potatoes.**—*Phytopathology*, 41, 9, pp. 801–803, 1951.

At the Plant Industry Station, Beltsville, Maryland, Maryland Golden sweet potatoes with some black rot (*Endoconidiophora* [*Ceratocystis*] *fimbriata*) [*R.A.M.*,

28, p. 641; 30, p. 244, *et passim*] at harvest were exposed for 8, 16, and 24 hours to each of three temperatures, 100°, 105°, and 110° F. No infection developed on those held at 110° and 105° for 24 hours or at 110° for 16, while 16 hours' treatment at 105° considerably reduced the incidence of black rot as compared with the unpasteurized lot. Other rots were not inhibited by pasteurization, which did not noticeably impair palatability or suppress sprout production.

NISHIKADO (Y.) & HIURA (U.). **On Macrophoma edulis D'Almeida causing a storage rot of Sweet Potatoes.**—*Rep. Ōhara Inst. agric. Res.* [*Ber. Ōhara Inst.*], 39, 3, pp. 37–40, 1 pl., 1951. [Japanese.]

The authors reported in 1947 that the fungus responsible for an important storage rot of sweet potatoes in Japan differs distinctly in its reaction to light and temperature conditions from *Sclerotium bataticola*, which seems to be related to [and is usually regarded as a state of] *Macrophomina phaseoli* [cf. *R.A.M.*, 27, p. 353]. The *Macrophoma* under observation differs in certain respects from *Macrophomina phaseoli* and related fungi in the size of its pycnidiospores. It is therefore referred to *Macrophoma edulis* D'Almeida.

IWATA (Y.). **Studies on the relations between the leaf maturity of Cucumber and infection by downy mildew.**—*Bull. Fac. Agric. Mie Univ.*, 2, pp. 34–42, 1951. [Japanese.]

The number and size of the stomata on cucumber leaves were measured on plants with seven to 16 leaves prior to inoculation on the lower surface with a spore suspension of downy mildew [*Pseudoperonospora cubensis*: *R.A.M.*, 30, p. 356] at the Faculty of Agriculture, Mie University, Japan. The number of stomata per unit area of the lower surface of the leaf is smaller on the lower than on the upper (younger) leaves. The number of downy mildew lesions resulting from inoculation is greater with the increasing number of stomata, and no lesions were observed on young leaves measuring less than 7 by 6 cm. or 30 sq. cm. in surface area, where the stomata are not fully differentiated. However, fairly large stomata were often observed at the ends of the large veins on young leaves bearing no lesions. On the surface of such leaves zoospore encystments are sparse and penetration by the fungus was scarcely observed.

From the results of the present experiments it appears that the non-occurrence of downy mildew lesions on young cucumber leaves may be due not to the absence of stomata but to the physiological condition of the leaves, which is adverse to the encystment, penetration, and further development of the fungus.

BALDACCI (E.). **Relazione sul servizio delle reti degli osservatori peronosporici nell' Oltrepò Pavese durante il 1950.** [Report on the service of the network of *Peronospora* observatories in the Pavia area of the Po valley during 1950.]—*Notiz. Malatt. Piante, 1951*, 14, pp. 47–51, 1951. [English summary, p. 102.]

Data supplied by the observatories in the Po valley [*R.A.M.*, 31, p. 6] showed that attacks of vine downy mildew (*Plasmopara viticola*) [ibid., 30, p. 505] in the Pavia area were very slight in April, 1950, because the temperature did not reach the minimum of 10° C. necessary for oospore germination [ibid., 28, p. 269], although rainfall was abundant. In May both temperature and rainfall favoured infection but the few spots which did develop remained sterile, thus indicating that attacks are dependent on factors other than climatic. Rainfall in May prevented some of the treatments against downy mildew, but the four or five sulphur or copper-sulphur sprays applied according to the spray calendar proved opportune and effective.

Oidium [*Uncinula necator*: ibid., 31, p. 6] occurred in epidemic form in May and

June in several areas. The attacks were due chiefly to the rather high temperatures (especially in June) alternating with light rainfall.

FINDLAY (G. M.). **The virus and the cell.**—*J. R. micr. Soc.*, Ser. III, 71, 2, pp. 151–175, 1951.

In this presidential address the author links together the phenomena of virus infection of cells (chiefly from the standpoint of animal viruses), cell mutations, changes of specific type in bacteria, drug resistance, and the various agents causing malignant disease. The various meanings which have been attached to the term 'virus' are discussed. The present conception is defined as an autocatalytic organism, largely composed of nucleoprotein and competing with the cell which it parasitizes for a substrate common to the virus and the cell nucleoproteins. The cytological changes produced in cells by viruses are discussed and their analogies to those occurring in mutated cells indicated. Since mutations can be induced in unicellular organisms by the addition of extrinsic nuclear material, it is suggested that a virus-infected cell may be regarded as a mutated cell. Such mutations would take place either by rearrangement of the pre-existing genes, occurring spontaneously or as a result of some extrinsic physical or chemical stimulus, or by the addition from outside of a virus nucleoprotein which acts as a mutagen.

BORG (Å.). **Några växtsjukdomar och skadedjur i Västergötland 1950.** [Some plant diseases and pests in West Gothland 1950.]—*Växtskyddsnotiser, Växtskyddsanst., Stockh., 1951*, 1, pp. 1–7, 3 figs., 1951.

During the winter of 1950 *Fusarium nivale* [*Calonectria nivalis*] was widespread in West Gothland, Sweden [cf. below, p. 108 and *R.A.M.*, 29, p. 249], on both rye and wheat, decimating whole stands of the former but generally causing little damage to the latter. *Ophiobolus graminis* occurred in a severe form on wheat. Rye suffered more or less extensive injury from a disease of the straw base with symptoms agreeing exactly with those of *Cercosporella herpotrichoides* [ibid., 30, p. 604], though the identity of the pathogen has not yet been determined.

Rape and colza crops were again heavily reduced by *Alternaria brassicae*, which was no doubt favoured by the exceptionally sunless and damp spring weather.

Epichloe typhina [ibid., 29, p. 249] developed over a wide area, and in a few of the seed crops it prevented the emergence of some 25 per cent. of the axillary panicles.

As in Denmark and Scania (south of Sweden), *Monilia* [*Sclerotinia*] *laxa* occurred in an unusually virulent form, especially on apple [loc. cit.], all the new shoots on some trees being wilted.

FOSTER (W. R.) & MACSWAN (I. C.). **Report of Plant Pathology Branch.**—*Rep. B.C. Dep. Agric., 1950*, pp. BB 18–BB 24, 1951.

In this report [cf. *R.A.M.*, 29, p. 349; 30, p. 404] it is stated that apple rosette due to zinc deficiency [ibid., 30, p. 275; 31, p. 50] has become increasingly prevalent in the Okanagan. Strawberry red stele [red core: *Phytophthora fragariae*: ibid., 30, p. 307] continues to be serious in some regions of the Lower Mainland, but increasing numbers of commercial growers are producing profitable crops on infested land by ridging the plants to improve drainage [cf. ibid., 31, p. 23]. Again no rejection of potatoes entered for certification was due to ring rot [*Corynebacterium sepedonicum*: ibid., 29, p. 349; 31, p. 53]; British Columbia remains virtually free from the disease.

Typhula blight [*Typhula* spp.: ibid., 29, p. 349] again caused serious damage to winter wheat in the Vanderhoof area. High resistance to bunt [*Tilletia caries* and *T foetida*: ibid., 29, p. 495; 30, p. 101] has been shown by the variety Wasatch [ibid., 31, p. 59], now licensed for sale.

A review of twenty years of crop, pasture, and fruit breeding in New South Wales, 1930–1950.—*Sci. Bull. Dep. Agric. N.S.W.* 72, 164 pp., 27 figs., 1 diag., 1950. [Received November, 1951.]

In this bulletin an attempt is made to bring together the work on and to review the course of plant breeding investigations in New South Wales from 1930 to 1950. It is arranged under the headings of the various crops and includes data on the development of disease resistant varieties, most of which has been noticed from time to time in this *Review*.

Plant diseases.—*Agric. Gaz. N.S.W.*, 62, 5, pp. 241–246, 7 figs. 1951.

Notes are given by R. D. Wilson on the symptoms and control of molybdenum deficiency in vegetables and legumes in New South Wales [cf. *R.A.M.*, 28, pp. 263, 372; 29, pp. 180, 396; 30, p. 489], where the condition has been reported throughout the central coastal area, particularly in the Liverpool, Parramatta, Blacktown, Richmond, and Windsor districts and in the eastern section of the Gosford–Wyong district. Responses to molybdenum have been obtained in a few areas on the north coast and in parts of the Southern Tableland, while evidence is accumulating that parts of the Central and Northern Tableland are also affected. Present recommendations for clovers and lucerne [ibid., 25, p. 562] are 2 oz. per acre molybdic oxide or equivalent amounts of sodium or ammonium molybdate mixed with superphosphate; for vegetable crops [ibid., 30, p. 136; 31, p. 96] (*a*) mixed with fertilizer, 1 lb. ammonium molybdate, or $1\frac{1}{4}$ lb. pure or 3 lb. crude (43 per cent.) sodium molybdate per acre; (*b*) seed-bed application, 1 oz. ammonium molybdate, or $1\frac{1}{4}$ oz. pure or 3 oz. crude sodium molybdate in 10 gals. water, watered on to each 10 sq. yds. of seed-bed a week or two before transplanting; (*c*) field application to growing crops, about $\frac{1}{3}$ oz. ammonium molybdate or pure sodium molybdate (or 1 oz. crude) per 3 to 4 gals. water, applied to the foot of the plants at the rate of about $\frac{1}{4}$ pint per plant or sprayed on to the leaves of plants such as tomatoes and beans.

Dahlia stunt [dahlia mosaic virus: ibid., 26, p. 340 and below, p. 121] has spread so rapidly during the last three seasons that it has now become one of the most serious and widely distributed diseases of dahlia in the urban parts of New South Wales. It has become established in many nurseries as well as in private gardens. All young dahlia plants should be carefully examined in spring and any showing distorted leaves or conspicuous clearing along the veins should be regarded as suspect and promptly destroyed.

Sixty-third Annual Report of the Colorado Agricultural Experiment Station 1949–50.—59 pp., [? 1950].

Among the items of phytopathological interest in this report [cf. *R.A.M.*, 25, p. 100] the following occur (pp. 19, 24). Ten methods of potato haulm destruction [ibid., 30, p. 534] tested at two soil moisture levels showed that internal discoloration of the tubers is negatively correlated with soil moisture. On dry soil sodium nitrite, dowspray 66 improved, and a flame-thrower produced significantly more discoloration than occurred in the controls. On wet soil sodium nitrite was the only treatment to cause significantly more internal discoloration than was present in the untreated. Sinox general, a roto-beater, and compound V5 produced significantly more discoloration on moist soil than on dry, while undercutting, sodium arsenite, and no treatment induced about the same amount on both soil types. In two experiments at Carbondale net necrosis was greatly reduced by early haulm removal.

Appreciable losses in potato stand were incurred through leak [*Pythium ultimum*: ibid., 28, p. 203]. In greenhouse tests there was a high death rate among tubers planted in highly infested soil, the seed piece rot [ibid., 30, p. 579] then

being irrespective of soil moisture. Storage at low temperatures (40° [F.]) greatly retards the progress of the disease. Tests on storage spread indicated that the fungus does not penetrate the unbroken cork of the skin, but enters to a slight extent through eyes and skin wounds. Several dry fungicides have shown promise in the treatment of seed pieces.

Studies on virus diseases of stone fruit demonstrated that the rasp leaf virus occurs on Montmorency cherry [ibid., 30, p. 142] and that incidence is not affected by the type of rootstock used. The results of a five-year study established that mild strains of peach mosaic virus [ibid., 30, p. 572] never become severe.

VARENICA (E. T.). **Adjusting the work of the State breeding stations in accordance with new tasks.**—*Agrobiology, 1949*, 4, pp. 16–30, 1949. [Russian. Abs. in *Plant Breed. Abstr.*, 20, 2, pp. 263–265, 1950.]

New cereal varieties produced at the State Breeding Stations in the U.S.S.R. include the winter wheats Novoukrainka, Voroshilovskaja, and hybrids 481 and 491, all resistant to rust [*Puccinia* spp.: *R.A.M.*, 31, p. 11], the hard wheats Arandany and Horanki, and the soft wheats Arazbugdasy, Shark, and Enelik, all resistant to drought and [unspecified] diseases. The hardy, productive, rust-resistant varieties Sovetskaja and Jubileĭnaja [Jubilee] were bred at the Mironovo Station. At Odessa Voroshilovskaja gave rise to a rust-resistant spring wheat. Ukrainka [see below, p. 111] was changed into a spring variety at the Alam Ata Station, which yields 3 to 4 c. [zentner] more per ha. than the standard spring variety and resists lodging and fungous diseases.

Mention is made of productive potato varieties resistant to wart disease [*Synchytrium endobioticum*: ibid., 30, p. 428] bred at the Belorusskaja, Petrovskaja, and Iygevskaja Stations.

ELLIOTT (CHARLOTTE). **Manual of bacterial plant pathogens. Second revised edition.** —viii+186 pp., 6 figs., Waltham, Mass., The Chronica Botanica Co.; London, W.C. 2, Wm. Dawson & Sons, Ltd., 1951. $6.

Part I of this entirely revised edition [*R.A.M.*, 10, p. 120] brings up to date all available information on the synonyms, cultural, morphological, and physiological characteristics, symptoms, geographical distribution, control measures, and important literature citations for the bacteria causing plant diseases. The nomenclature follows largely that of the 1948 edition of Bergey's Manual [ibid., 28, p. 512]. Part II includes descriptions of bacteria reported on plants in the literature but not recognized as valid plant pathogens. There are indexes to the genera and species of both plant hosts and the bacteria. Two new combinations are made.

WHITE (P. R.). **Neoplastic growth in plants.**—*Quart. Rev. Biol.*, 26, 1, pp. 1–16, 1951.

A five-page bibliography forms the basis of this review of the available information on abnormal growth in plants, including limited galls of virus, bacterial, and fungal origin. A special section is devoted to the non-limited neoplasms caused by *Phytomonas* [*Bacterium*] *tumefaciens*, which are considered to present a genuine analogy with human and animal cancer [cf. *R.A.M.*, 22, p. 241; 27, p. 178, and next abstract].

DE ROPP (R. S.). **The crown-gall problem.**—*Bot. Rev.*, 17, 9, pp. 629–670, 1951.

In this paper an attempt is made to review, in the light of more recent work, the assertions of E. F. Smith and his colleagues based on the results of their pioneer researches on crown gall (*Bacterium tumefaciens*). The problem is discussed from the aspects of the causal organism, host-parasite relationship, the transforming principle, species and tissue susceptibility, secondary tumours, isolation of bacteria-free crown gall tissue, the physiological characteristics of infected tissue, tumour

induction by bacteria-free crown gall tissue, chemical transformation of healthy tissues, reversion of tumorous to normal tissue, histology and cytology of affected tissue, substances antagonistic to the organism, and the relation between crown gall and animal cancer [*R.A.M.*, 31, p. 8 and preceding abstract]. A bibliography of 161 titles is appended.

Dimond (A. E.), Stoddard (E. M.), & Rich (S.). **The effect of dyes in retarding the development of crown galls.**—*Phytopathology*, 41, 10, pp. 911–914, 1951.

At the Connecticut Agricultural Experiment Station, Bonny Best tomatoes, grown in sand and supplied three times weekly with Hoagland's solution, were injected with various dyes in the vascular region of the stem just below the point of inoculation with *Agrobacterium* [*Bacterium*] *tumefaciens* (*a*) two days beforehand, (*b*) on the day of inoculation, and (*c*) one day later. In treatment (*a*) malachite green, chlorophenol red, and aniline blue (all at 0·05 per cent.) reduced the size of the galls from 4·8 to 1·9, 1·7, and 1·4 mm., respectively, these values being probably significant at odds of 20:1 by analysis of variance [cf. *R.A.M.*, 30, p. 403]. The later treatments were without appreciable effect, and in no case was gall formation entirely prevented. The dyes retarding gall development in this way were not necessarily toxic to the pathogen *in vitro*. No correlation could be established between the chemical structure of the dyes and their *in vitro* or *in vivo* toxicity to *B. tumefaciens*.

Stapp (C.). **Der Pflanzenkrebs und sein Erreger Pseudomonas tumefaciens. XV. Mitteilung. Weitere Untersuchungen über Virulenzbeeinflussungen und Bekämpfungsmöglichkeiten.** [Crown gall and its agent *Pseudomonas tumefaciens*. Note XV. Further studies on factors influencing virulence and on possibilities of control.]—*Phytopath. Z.*, 17, 4, pp. 333–347, 3 figs., 1951.

Using five cultures of the *Dahlia* Ra, *Chrysanthemum frutescens* IIb, and *Populus* 7 strains of *Pseudomonas* [*Bacterium*] *tumefaciens* [*R.A.M.*, 25, p. 293], the author obtained conflicting results in his attempts to weaken the virulence of the pathogen by the addition of α-alanin to a solid medium (glycocol agar). On the other hand, similar treatment with indoleacetic acid at 0·0001 to 0·1 per cent. resulted in a clear-cut tendency to enhanced virulence, gauged by the comparative dimensions of the tumours on tomato and *Datura tatula* plants inoculated with the organism from media with and without the growth substance.

The successful results of Brown and Boyle in the therapy of crown gall [ibid., 24, pp. 140, 406] were not confirmed by the author's experiments, and all his endeavours to detect substances antagonistic to *B. tumefaciens* in over 70 strains of fungi and 30 of actinomycetes were fruitless. It was, however, possible to destroy fresh tumours on *D. tatula* by supercooling with ether or ethyl chloride, though the subsequent resumption of growth by the pathogen could not be entirely prevented.

Ark (P. A.). **Phenotypic variations induced by chemicals in Corynebacterium michiganense and Xanthomonas juglandis.**—*J. Bact.*, 61, 3, pp. 293–297, 4 figs., 1951.

In experiments at the University of California, Berkeley, acenaphthene, α-nitronaphthalene, 3-bromoacenaphthene, ethyl-α-naphthoate, and 5-amino-acenaphthene, introduced into a nutrient broth (pH 7) at a concentration of 5 gm. per l., induced many different types of variant in *Corynebacterium michiganense* [*R.A.M.*, 25, p. 440] and *Xanthomonas juglandis*. All the compounds gave rise to a white variant in the normally creamy-yellow *C. michiganense*, except 5-amino-acenaphthene, which incited the development of two rough, wrinkled types, one of butyrous consistency and the other a dry, flaky colony. After 30 days in α-nitronaphthalene

broth *X. juglandis* was converted into an extremely rugose type which did not regain its original smooth roundness.

Uranium chloride, nitrate, and sulphate, at concentrations of 1 ml. per 9 ml. broth, effected outstanding changes in the naturally smooth types of the two bacteria [cf. ibid., 28, p. 374].

Tested on their respective hosts, tomato and walnut, all the variants of both species proved to be more or less pathogenic.

Some of the new variants of *C. michiganense* were very unstable on potato dextrose peptone agar slants, but all those of *X. juglandis* remained stable.

The changes induced by the chemicals are believed to be of a mutagenic nature.

Chapman (G.), Hillier (J.), & Johnson (F. H.). **Observations on the bacteriophagy of Erwinia carotovora.**—*J. Bact.*, 61, 3, pp. 261–268, 3 figs., 1 graph, 1951.

Electron micrographs of specimens from plaques on a 1·5 per cent. agar preparation of a bacteriophage causing lysis of a strain of *Erwinia carotovora* [*R.A.M.*, 4, p. 753] responsible for onion soft rot [ibid., 24, p. 398] in New Jersey revealed a diversity of phage or phage-like particles. Besides the familiar head or body and a single tail, the forms included, *inter alia*, dumb-bell- and rod-shaped particles, bodies without tails and conversely, and bodies with one or more tails at each end. The 'dried prune' appearance of the unlysed cells of the bacterium from a phage-infected culture is generally similar to that described by Houwink and van Itersen (*Biochim. biophys. Acta*, 5, pp. 10–44, 1950) for *Erwinia* sp., but the significance of the dense, circular areas in each cell is not clear.

Patel (M. K.), Kulkarni (Y. S.), & Dhande (G. W.). **Three bacterial diseases of plants.**—*Curr. Sci.*, 20, 4, p. 106, 1951.

Of the three bacterial diseases new to India encountered in a phytopathological survey of Bombay State, that on *Begonia* sp. is in all respects similar to the one caused by *Xanthomonas begoniae* [*R.A.M.*, 29, p. 414; 31, p. 9]. The symptoms induced on *Stizolobium deeringianum* [*Mucuna deeringiana*] by *X. stizolobiicola* n.sp. and on *Piper betle* by *X. betlicola* n.sp. are indistinguishable from those due to *Pseudomonas stizolobii* [cf. ibid., 14, p. 87] and *P. betlis* [ibid., 7, p. 741], respectively, but there are differences between the causal organisms.

The new species are slender, motile, capsulated rods, without spore or involution forms, Gram-negative, aerobic, liquefying gelatin and Loeffler's blood serum, hydrolysing starch and casein, and producing ammonia and hydrogen sulphide, but no indole; utilizing dextrose, lactose, and sucrose, with acid but no gas formation; making no growth in synthetic asparagine medium; and lipolytic. The colonies of *X. stizolobiicola* are creamy to pinard yellow, glistening, flat, with entire margins, attaining a diameter of 8 mm. in four days on nutrient and potato dextrose agars, while those of *X. betlicola* are baryta yellow, with lobate margins and peripheral striations and measure 11 mm. after seven days.

Lindeberg (G.) & Molin (Kerstin). **Notes on the physiology of the Cacao parasite Marasmius perniciosus.**—*Physiol. Plant.*, 2, 2, pp. 138–144, 2 graphs, 1949.

A strain of *Marasmius perniciosus* was isolated at the Institute of Physiological Botany, University of Uppsala, Sweden, from infected cacao pods received from Ecuador [*R.A.M.*, 31, p. 56]. They were of the strawberry-shaped type, only 3 to 5 cm. in length, with a very hard, dark brown cortex, as described by Dale [ibid., 26, p. 383]. The strain proved to be absolutely thiamine-heterotrophic. Its growth was considerably increased by the addition to the medium of hydrolysed casein or yeast extract, the following mycelial dry weights having been obtained

in one test after 10 days: with 1γ thiamine per flask, 5·5 mg.; the same with 10 mg. hydrolysed casein, 10·3 mg., or with 10 mg. yeast extract, 15·6 mg. Maximum growth occurred at pH 5 to 6, but development was also good at pH 7. Both ammonium nitrate and nitrate nitrogen were utilized, and asparagine was found to be a very satisfactory source of nitrogen. After 228 days' growth of *M. perniciosus* on sterilized litter of *Glyceria maxima*, 40 per cent. of the dry matter, 46 per cent. of the lignin, and 77 per cent. of the cellulose were decomposed.

It is concluded that the nutritional requirements of *M. perniciosus* do not differ essentially from those of the saprophytes of the same genus [ibid., 28, p. 320].

Otoyo (F. J.) & Rojas Peña (E.). **La 'escoba de bruja' en la Intendencia del Meta.** [Witches' broom in the del Meta district.]—*Agricultura, Bogotá*, 5, 6, pp. 47–53, 1949. [Abs. in *Hort. Abstr.*, 21, 1, p. 137, 1951.]

An account is given of the findings and recommendations of a commission set up to investigate the reported appearance of witches' broom disease of cacao (*Marasmius perniciosus*) [cf. *R.A.M.*, 30, p. 145 and preceding abstract] in the del Meta district of Colombia [C.M.I. map No. 37]. Although the presence of the fungus was not confirmed, typical symptoms were observed in three holdings. Control measures and possible alternative crops are suggested.

Petit (A.). **Remarques sur la désinfection chimique des semences de céréales.** [Notes on the chemical disinfection of cereal seed.]—*Ann. Serv. bot. agron. Tunis.*, 22, pp. 79–94, 1949. [Received August, 1951.]

This is a full account of the author's experiments with cereal seed disinfectants in Tunis [*R.A.M.*, 30, p. 460]. Finely ground tetracupric oxychloride (50 per cent. copper) was active against wheat bunt (*Tilletia levis*) [*T. foetida*: loc. cit.], and copper chromate against covered smut of barley (*U. hordei*), while copper chloride controlled both diseases.

Andrén (F.). **1949–50 års betningsförsök med stråsäd.** [Cereal seed disinfection experiments 1949–50.]—*Växtskyddsnotiser, Växtskyddsanst., Stockh., 1951*, 1, pp. 12–16, 1951.

Weather conditions in Sweden during the winter of 1949–50 favoured snow mould [*Calonectria nivalis*] development [see above, p. 103]. Three brands of panogen with a higher mercury content than the original product of that name, namely, K–3, 14–4, and 14–5, were included in tests at four branches of the Plant Protection Institute [*R.A.M.*, 30, p. 28]. Used at the rate of 100 ml. per 100 kg. (half the normal strength), they raised the grain yields of rye from 3,055 to 3,490, 3,355, and 3,465 kg. per ha., respectively, and those of wheat from 4,125 to 4,730, 4,840, and 4,740 kg. per ha., respectively, besides reducing the number of wheat plants infected by bunt [*Tilletia caries*] from 189·7 to 0, 0, and 0·1 per 10 sq. m., respectively. The highest yield of rye (3,560 kg. per ha.) was produced by the seed treated with betoxin F (200 ml. per 100 kg.), and that of wheat (4,840 kg. per ha.) by panogen 14–4.

Betoxin 61 and panogen DGSV (200 ml.) gave the largest increases in barley yields, averaging 3,725 and 3,705 kg. per ha., respectively, compared with 2,025 in the control plots, but the most effective control of stripe disease [*Helminthosporium gramineum*] was obtained by treatment with aagrano (200 ml.), which reduced the number of infected plants per sq. m. from 570·2 to 1·4, followed by lunasan, hormotan, and betoxin F (all at 200 ml.), with 2·4, 2·5, and 2·8, respectively.

Täyssato (300 ml.) produced the highest yield of oats (3,930 kg. per ha. as against 3,040 from the untreated plots), but did not eliminate loose smut [*Ustilago avenae*] quite so thoroughly as aagrano, betoxin F and 61, hormotan, lunasan, and panogen

DGSV at the same strength, all of which reduced the number of diseased plants per 10 sq. m. from 830·9 to less than one.

Buchwald (N. F.). **Rust paa sæden.** [Rust on seed-grain.]—*Nord. Jordbr Forskn.*, *1951*, 2–3, pp. 478–479, 1951.

Since the adoption in 1903 of legislation for barberry eradication in Denmark, there have been no virulent outbreaks of cereal black rust (*Puccinia graminis*) [*R.A.M.*, 25, p. 96] involving the whole country. Severe local epiphytotics since that date have nearly always been traceable to infected barberry bushes in the vicinity, while the milder attacks that used to occur almost every year have practically ceased or do not develop until the late summer.

During the last century and from 1900 to 1925 yellow rust (*P. glumarum*) [C.M.I. map No. 97] was one of the principal limiting factors in wheat cultivation [*R.A.M.*, 6, p. 636], but since then its incidence has noticeably declined with the increasing use of resistant varieties. This reaction, however, does not appear to be absolute, as conspicuously exemplified by Svalöf-Panser, the high resistance of which, after being maintained for a number of years, suddenly broke down in 1923, both in Denmark and Scania [south of Sweden], presumably as a result of a shift in the distribution of physiologic races [ibid., 29, p. 149]. Heavy infection of spring barley is almost invariably associated with attacks on winter barley at a distance of 200 to 600 m., and after the outbreaks of 1929 and 1930, causing losses of economic importance, strong opposition to further cultivation of the winter crop resulted in its virtual discontinuance. Under an Order of 23rd March, 1948, compensation may be claimed in respect of infection of spring barley by yellow rust or mildew [*Erysiphe graminis*] spreading from winter crops.

Crown rust (*P. lolii*) [*P. coronata*] is widespread on oats, but frequent and severe outbreaks are mostly limited to fields in immediate proximity to *Rhamnus cathartica* [loc. cit. and ibid., 28, p. 388] or to late-sown (May) crops. However, the numerous heavy attacks of 1935 and 1937 could not be traced to the presence of any species of *Rhamnus* and were no doubt attributable to the transport of aecidio- and uredospores by the prevailing easterly winds in May and June of those years. *Lolium perenne* is the most susceptible grass host.

Barley rust (*P. hordei*) has been of little importance in Denmark since 1930, and neither *P. dispersa* on rye [C.M.I. map No. 226] nor *P. triticina* on wheat is of any account, the latter, in fact, being scarcely ever mentioned in phytopathological literature.

Crop trials—report for 1951.—*Countryman, Cyprus*, 5, 11, pp. 15–17, 1951.

In variety trials carried out in Cyprus during 1951, B.X.I.P.I. wheat was scarcely attacked by stem rust (*Puccinia graminis*) [*R.A.M.*, 29, p. 12] at the Central Experimental Farm and at Xylophagou, but was more susceptible to yellow rust (*P. glumarum*) [ibid., 18, p. 90]. Giza and the departmental hybrid Ca23 also suffered only slight attack by stem rust, but were more severely affected by yellow and brown rust (*P. triticina*) [loc. cit.]. Cabo appeared to have escaped stem rust attack completely but was extremely susceptible to yellow rust.

Pugsley (A. T.). **Fifty years of Wheat improvement in South Australia.**—*J. Dep. Agric. S. Aust.*, 54, pp. 435–440, 3 figs., 1 graph, 1951.

The author traces the progress made in selecting and breeding wheat varieties for resistance to stem rust [*Puccinia graminis*] in South Australia [*R.A.M.*, 30, p. 19] during the past fifty years, particularly at Roseworthy College, Parafield Experimental Farm, the Department of Agriculture, and the Waite Agricultural Research Institute [ibid., 28, p. 622; 30, p. 364]. Some modern breeding methods are briefly described.

Rupert (J. A.). **Rust resistance in the Mexican Wheat improvement program.**—*Foll. tec. Ofic. Estud. esp. Méx.* 7, 44 pp., 1951. [Spanish summary.]

An increase in domestic wheat production was the goal of a co-operative programme of the Mexican Ministry of Agriculture and the Rockefeller Foundation launched in 1944 and the results so far obtained are presented. It was recognized from the outset that stem rust (*Puccinia graminis*) [*R.A.M.*, 30, p. 150], and to a lesser extent leaf and stripe rusts (*P. triticina* and *P. glumarum*) [ibid., 28, p. 623], were important limiting factors in this objective, the first step in which was the development of prolific varieties, resistant not only to the rust races prevalent in Mexico but also to 15B prevalent in the United States, to replace the susceptible local types. Two such lines, Supremo (Rocamex 221) and Kenja Rojo (Rocamex 324) [loc. cit.], were selected for increase and distribution and are at present under cultivation on an area covering 1,000,000 acres. Wheat production has become practicable for the first time in Mexico during the summer rainy season through the use of these varieties.

Five new hybrids from Rocamex, all resistant to *P. glumarum* and moderately so to *P. graminis*, namely, Yaqui 48, Chapingo 48, Nazas 48, Mayo 48, and Kentana 48, are now in the first commercial increase on some 20,000 acres in four important wheat-growing regions, and are undergoing further improvement by the addition of resistance to leaf rust in a series of back- and multiple crosses. Selected lines resistant to all three rusts are BC II Nos. 743, 190, and 735, while 19 other lines are segregating for this character.

Noll (A.). **Über mikroskopische Anfangssymptome der Resistenz und Anfälligkeit von Weizensorten gegen Puccinia glumarum.** [On microscopic incipient symptoms of resistance and susceptibility of Wheat varieties to *Puccinia glumarum*.]—*Phytopath. Z.*, 17, 4, pp. 400–405, 1951.

Holz's cotton blue stain for the detection of *Fusicladium* [*Venturia inaequalis*] mycelium in apple leaves was applied to the study of correlations in the foliage of 11 differential wheat varieties [*R.A.M.*, 12, p. 272] between mycelial growth and the occurrence of stained (gummous) host cell complexes within the range of activity of the pathogen on the one hand and reaction to races 2, 7, 44, and 54 of *Puccinia glumarum* on the other [ibid., 23, p. 58]. Such correlations were generally most pronounced in cases of extreme resistance (verging on immunity) or susceptibility, the former being characterized by a few poorly developed hyphae in blue-stained tissue complexes and the latter by extensively branched mycelia with numerous haustorial initials and no blue-stained tissue. These incipient microscopic symptoms of yellow rust infection are discernible five days after inoculation, i.e., some ten days before the appearance of external signs of the disease.

Lhoste (J.) & Ravault (Lucienne). **Contribution à l'étude de l'hexachlorobenzène produit actif contre les spores de Tilletia tritici Berk.** [Contribution to the study of hexachlorobenzene, a product active against the spores of *Tilletia tritici* Berk.]—Reprinted from Proceedings of the 2nd International Congress of Crop Protection, 9 pp., [? 1950].

The results are given of experiments carried out in France, using Vilmorin Bon Fermier wheat infected at the rate of 0·3 gm. per kg. of seed with spores of *Tilletia tritici* [*T. caries*] and soaked in or dusted with hexachlorobenzene [cf. *R.A.M.*, 30, p. 460]. Dusting at a rate of 8 gm. per 100 kg. infected seed gave complete control; at higher rates of infection (up to 2·4 gm. spores per kg. seed) 20 gm. was adequate.

It was established that the fungicide is active chiefly through its vapour dissolved in the water necessary for spore germination. In distilled water previously

exposed to the vapour for 24 hours, the percentage germination was 18·7 compared with 36 for the control. The toxic action of a suspension in soil solution does not become apparent until some time after the beginning of growth, spores removed from such a medium after 24, 48, and 72 hours being capable of 30, 25, and 20 per cent. germination, respectively (control 35 per cent.). It appears that the specificity of hexachlorobenzene for *T. caries* can be explained only on the assumption that there is incompatibility between the fungicide and an enzyme peculiar to the fungus, the nature of which is unknown.

Further experiments have demonstrated that this material is innocuous to wheat and less toxic to animals than other organic synthetic fungicides or insecticides in current use.

Kochkin (S. A.). **The epidemics of yellow rust in winter Wheat in the Issyk Kulj Basin.**—*Selection & Seed Growing, 1949*, 10, pp. 57–59, 1949. [Russian. Abs. in *Plant Breed. Abstr.*, 20, 2, p. 281, 1950.]

Winter wheat varieties bred at the Kirgizian Breeding Station were much less susceptible to yellow rust [*Puccinia glumarum*: C.M.I. map No. 97] in the Kirgizian Republic than introduced varieties. *Erythrospermum* 9, which was made a standard in 1947, yielded 3·5 c. [zentner] more per ha. than the previous standard Ukrainka [see above, p. 105] in the average season, and 12·6 to 17·2 c. per ha. more in seasons when rust epidemics occurred. The new lines *erythrospermum* 72, 115, 132, and 4655 showed promise in trials.

Bever (W. M.). **Differential lethal effect of hot-water treatment on the loose smut mycelium in nine varieties of winter Wheat.**—*Phytopathology*, 41, 10, pp. 875–879, 1951.

Over a four-year period at the Illinois Agricultural Experiment Station, the mycelium of wheat loose smut [*Ustilago tritici*] was eliminated from naturally infected seed of the Brill variety by ten minutes' immersion in water heated to 138° F. following four hours pre-soaking at 60° [cf. *R.A.M.*, 20, p. 10; 31, p. 59], but it survived in Royal until a temperature of 141° was reached, in Illinois Selection 37–1146, Goens, and Saline up to 144°, and in Wabash up to the maximum of 147°, at which temperature there were still 1·37 per cent. smutted heads in plants developing from Clarkan seed. Of the two varieties resistant to the local physiologic races of the smut [ibid., 27, p. 227] included in the trials, Kawvale was entirely, and Wisconsin Pedigree No. 2 practically free from smut even without treatment.

In tests on four varieties Brill absorbed the most water during the four-hour pre-soak, its moisture content increasing by 35·8 per cent. of the dry weight, and Clarkan the least (17), suggesting the possibility that this factor may determine the temperature necessary to kill the mycelium. A six-hour pre-soak, followed by ten minutes' immersion at 130°, entirely destroyed the mycelium in Illinois Selection 37–1146–3, Brill, Goens, and Clarkan, but reduced the germination percentages from 87 to 80, 87 to 81, 85 to 73, and 90 to 85, respectively. In the first experiment referred to above an immersion temperature of 138° appeared to be critical for Illinois Selection 37–1146, Kawvale, and Wisconsin Pedigree No. 2, reducing their germination percentages from 90 to 32, 80 to 33, and 90 to 28, respectively; treatment at 141° was less injurious. These results are of special interest in relation to published work on the effect of the modified hot-water treatment on seed germination [ibid., 3, p. 712; 31, p. 60].

The introduction of hot water into the treatment container proved more effective than the use of live steam in the maintenance of a uniform temperature during the immersion period.

Carter (E. P.) & Young (G. Y.). **Role of fungi in the heating of moist Wheat.**—*Circ. U.S. Dep. Agric.* 838, 26 pp., 2 figs., 4 graphs, 1950.

Many species of fungi were isolated at the Division of Cereal Crops and Diseases, Bureau of Plant Industry, United States Department of Agriculture, from 355 samples of soft and hard red winter and hard red spring wheats [see next abstract]. *Aspergillus* and *Penicillium* spp. usually predominated on the surface of the kernels, while *Alternaria* [*R.A.M.*, 30, p. 603] and *Aspergillus* spp. were commonly found in the interior. It was estimated that No. 1 grade soft red winter wheat carried 3,000 to 57,000 spores per kernel, the number rising to several million after the heating of moist grain. *A. candidus* was usually concerned in active heating, temperature increments of 20° to 26° C. being attained in samples contaminated by this species. *A. glaucus*, reproducing by means of its ascospores, preponderated in moderately heated samples. Moist wheat, treated to prevent the action of respiratory enzymes and then exposed to reinfection by spores in the atmosphere, heated at a similar rate and reached the same temperature maximum as untreated. Moist wheat of high germinability treated with new improved ceresan at a dosage of 0·48 gm. per qt. did not heat and contracted only slight fungal infection, while a heavy application of chloropicrin (10 ml. per qt.) inhibited both heating and fungal activity. However, toxic chemicals of this kind could not be used on wheat intended for human or animal consumption. High-moisture wheat stored in sealed vacuum containers did not heat; bacteria, but no fungi, were isolated from these samples.

In tests with the Warburg respirometer steam-sterilized moist wheat did not respire and heating was not observed. High rates of respiration and heat production were noted in moist sterilized wheat inoculated with *A. candidus*, *A. flavus*, or *A. niger* [ibid., 30, p. 425]. Ascospore production in *A. glaucus* was associated with moderate oxygen uptake and very little heating, whereas the appearance of conidia coincided with higher respiratory measurements and more heating [ibid., 30, p. 531].

The data accumulated in the course of this study (which is supplemented by a bibliography of 45 titles) indicate that the heating of moist wheat in commercial storage, the average annual loss from which has been computed at some $2,000,000 (*Tech. Bull. U.S. Dep. Agric.* 6, 32 pp., 1927), can be entirely accounted for by the energy released during the respiration of the fungi on and in the kernels.

Christensen (C. M.). **Fungi on and in Wheat seed.**—*Cereal Chem.*, 28, 5, pp. 408–415, 3 figs., 1951.

In studies at the Minnesota Agricultural Experiment Station to determine (1) the relative amount of external and internal inoculum of moulds on stored wheat [*R.A.M.*, 27, p. 417 and preceding abstract] and (2) the proportion and identity of living mycelium beneath the pericarp, most of the seed samples used were from commercial lots of the 1948 crop from North Dakota to Texas, but a few ranging from five to 60 years old were included. All were stored in a refrigerator at 5° C. from late in 1948 until towards the end of 1949.

Fungi known to be responsible for the deterioration of moist stored wheat occurred as dormant spores on the surface of the seed and as dormant mycelium within the pericarp, being much more abundant in the former state. Both forms were more prevalent in the low-grade lots (containing 10 to 30 per cent. damaged seed) than in those of high quality (top commercial grade).

Mycelium (mostly dead) was present beneath the pericarp of all the seeds examined; no living mycelium was detected in lots more than eight years old. In the high-grade samples most of the living mycelium below the pericarp was that of a species of *Alternaria* [loc. cit.], while the principal contaminants of low-grade seed were *Aspergillus glaucus*, *A. tamarii*, *A. flavus*, *A. versicolor*, *A. niger*, *A. ochraceus*, and *Penicillium* sp.

Oswald (J. W.) & Houston (B. R.). **A downy mildew of Barley in California.**—Abs. in *Phytopathology*, 41, 10, p. 942, 1951.

The downy mildew of barley reported by Mackie from California in 1929 [*R.A.M.*, 9, p. 370] was not again observed in the State until the spring of 1951, when all the plants in large areas of a field near Davis were dead and the tissues matted and shredded. Plants on the margins of these patches showed severe yellow leaf-streaking and were stunted, many of the tillers being killed outright. The shredded leaves, consisting mainly of fibrovascular tissues, were packed with oospores typical of the genus *Sclerospora*. Barley seedlings in soil from the diseased field were stunted and chlorotic. Histological examination revealed *Sclerospora* mycelium, oospores, and an abortive sporangial stage. The oospores, 20 μ in diameter, could not be induced to germinate. The only species of downy mildew hitherto reported on barley is *S. macrospora* [ibid., 29, p. 462], with oospores 60 μ in diameter, which is not responsible for tissue-shredding. The fungus attacking the crop in 1951 is more reminiscent of *S. graminicola* [ibid., 29, p. 385], which does cause shredding, but this species has been recorded for the most part on hosts in the tribe Paniceae of the family Gramineae.

Starkov (A. A.). **A biological method for the control of loose smut.**—*Selection & Seed Growing, 1949*, 8, pp. 69–70, 1949. [Russian. Abs. in *Plant Breed. Abstr.*, 20, 2, p. 279, 1950.]

Good control of barley loose smut [*Ustilago nuda*: *R.A.M.*, 27, p. 13] was obtained in the Rostov province, U.S.S.R., with the spring variety Pallidum 43 by Lysenko's method of late autumn sowing. The effect of a single treatment lasted for several years. More extensive use of this method in commercial farming is recommended.

Atkins (I. M.) & Coffman (F. A.). **Mustang, a hardy new winter Oat.**—*Agron. J.*, 43, 6, pp. 287–291, 2 figs., 1951.

A new variety of winter oats, Mustang, developed from the cross Fulwin × Lee-Victoria, appears to be able to compete with the long-established Red Rustproof types under Texas conditions. It is resistant to crown rust [*Puccinia coronata*], averaging only 1 per cent. infection in five seasons compared with 58 per cent. for Fulwin. Though susceptible to *Helminthosporium victoriae* [*R.A.M.*, 30, p. 225] in heavily infested soil, Mustang is reasonably tolerant of Victoria blight—certainly more so than most Victoria derivatives. Moreover, its earliness often enables it to escape damage by stem rust [*P. graminis*].

Naundorf (G.) & Serrano (C.). **Contribución al tratamiento de semillas de Maíz para aumentar y asegurar la cosecha. Un proceso nuevo combinado de fertilización, desinfección y hormonización.** [Contribution to the treatment of Maize seeds to augment and assure the harvest. A new combined process of fertilizing, disinfection, and hormonization.]—*Acta agron., Palmira*, 1, 2, pp. 87–92, 1951. [English summary.]

At the Palmira (Colombia) Agricultural Experiment Station an economical new method of maize seed treatment [against unspecified diseases] has been developed, consisting in the application of a mixture of nutritive and accessory substances [cf. *R.A.M.*, 30, p. 423], fungicides, and phytohormones. Three combinations were used, all containing the complete amount of nutritive and accessory substances supplemented by (1) semesan alone, (2) the same plus α-naphthalene-acetic acid, and (3) the disinfectant plus 2,4-dichloro-phenoxyacetic acid. The best results were given by combination (3), which increased the yield by 26·4 per cent. as compared with 25·2 and 18·2 for (2) and (1), respectively. Both (2) and (3) raised the oil content of the seed by 14·9 per cent. as against only 2·1 for (1).

KARPER (R. E.). **Registration of Sorghum varieties, VI.**—*Agron. J.*, 43, 5, p. 243, 1951.

Tift Sudan, Reg. No. 95, the only sorghum registration approved in the United States during the past year [cf. *R.A.M.*, 29, p. 207], originated from a cross between Sudan grass and Leoti sorgo made in 1936. The leaves carry recessive tan plant colour and glossy leaf character, both of which contribute to its high resistance to many of the bacterial and fungal diseases of the foliage prevalent in the humid regions of the southern and eastern United States.

KNORR (L. C.) & DUCHARME (E. P.). **Anotaciones sobre lepra explosiva.** [Notes on 'lepra explosiva'.]—*Idia* (formerly *Inform. Direcc. Invest. agríc., B. Aires*), 4, 42–43, pp. 32–38, 4 figs., 1951.

The information presented in this paper on the identity of 'lepra explosiva' in Argentina and scaly bark (leprosis) of citrus in Florida has already been noticed from another source [*R.A.M.*, 30, p. 465].

ALDRICH (D. G.), VANSELOW (A. P.), & BRADFORD (G. R.). **Lithium toxicity in Citrus.**—*Soil Sci.*, 71, 4, pp. 291–295, 1 fig., 1951.

Lithium toxicity symptoms were artificially induced in lemon, grapefruit, and Valencia and navel oranges [*R.A.M.*, 8, p. 717] at the California Citrus Experiment Station, and the presence of the element in the affected plants was confirmed by a spectrochemical method. On the basis of the symptoms induced by the application of lithium salts to seedlings in the greenhouse and to mature trees in the field, lithium toxicity in the latter was recognized and confirmed by analysis. The lithium contents of the young and mature leaves, top bark, top wood, root bark, and root wood of sweet orange seedlings grown in soil treated with lithium sulphate at 2 p.p.m. were 25, 220, 25, 15, 20, and 5 p.p.m., respectively; and of the leaves, fruit peel, and fruit juice of Eureka lemon trees supplied with lithium chloride at 4 p.p.m., 50, 2, and 0·5 p.p.m., respectively.

GRIEBEL (C.). **Durch Pilzbefall verdorbene Cocosnüsse.** [Coco-nuts spoilt by fungal infection.]—*Z. Untersuch. Lebensmitt.*, 92, 3, pp. 184–185, 1951.

The mould isolated from rancid coco-nuts at the Institute of Foodstuffs, Drugs, and Forensic Chemistry, Berlin, was identified as a species of *Mucor*. Entry to the endosperm had been effected through one of the three germ pores in the endocarp.

COSTA (A. S.) & FRANCO (C. M.). **A virus technique useful to diagnose foliar deficiencies.**—*Plant Physiol.*, 26, 3, pp. 625–628, 1 fig., 1951.

Spraying iron salts on the chlorotic leaves of coffee plants at the Agronomic Institute, Campinas, São Paulo, Brazil (*Bragantia*, 9, pp. 165–173, 1949), elicited virtually no response, whereas the application with a de Vilbiss atomizer of 1 per cent. solutions of ferric chloride and ferrous sulphate to half leaves, followed by abrasion with carborundum [*R.A.M.*, 15, p. 737], resulted in the development of a vivid green coloration. There was no reaction to the use of the abrasive with water or solutions of other salts. In preliminary tests, not described in this paper, the carborundum technique proved useful in the diagnosis of foliar deficiencies in citrus.

CABRAL (A.). **O 'wilt' na Província do Sul do Save.** [Wilt in the Province of Sul do Save.]—*Agron. lusit.*, 13, 1, pp. 13–18, 7 figs., 1951. [English summary.]

A severe epiphytotic of cotton wilt (*Verticillium dahliae*), causing over 50 per cent. infection, occurred in the Province of Sul do Save, Mozambique, in 1949, this being the first record of the disease for the Colony. It was most prevalent in the

impermeable, heavy clay soils of the Limpopo Valley. The suggestion that infection might have been introduced on seed of the A–2106 variety, imported from Barberton, South Africa [*R.A.M.*, 30, p. 156], is rejected as untenable. The symptoms of the wilt are briefly described and control measures recommended, including immediate eradication and burning of infected plants; collection of seed from resistant plants in the more severely infected areas for sowing next season in heavily contaminated soils; delinting of Limpopo Valley seed with sulphuric acid before export to any other district; crop rotation; and application of soil amendments, especially where potassium deficiency has been demonstrated.

L'activité de l'I.R.C.T. pendant la campagne 1949–1950. [The work of the I.R.C.T. during the season of 1949–1950.]—*Coton Fibres trop.*, 6, 1, pp. 1–44, 22 figs., 9 diags., 2 maps, 1951.

The following items of phytopathological interest occur in this report of the Institut de Recherches du Coton et des Textiles Exotiques. At the Anie-Mono Station, Togo, French West Africa, well-defined symptoms of cotton leaf curl [virus: C.M.I. map No. 25; *R.A.M.*, 30, p. 319] were observed on the Togo Sea Island variety. N'Kourala 4507 showed no sign of the disease (p. 19).

At the Bambari Station, Ubangi, French Equatorial Africa, a mass selection was effected with the Arkansas 17 variety, which is of interest by reason of its resistance to wilt [? *Fusarium vasinfectum*: ibid., 27, p. 377] and length of fibre. Ten first lines were destroyed by a severe outbreak of anthracnose [*Glomerella gossypii*], but five have been retained with a length ranging from 29 to 32 mm. and a yield at ginning of from 37·2 to 38·9 per cent. (p. 27).

At the same Station blackarm (*Xanthomonas malvacearum*) assumed an exceptionally virulent form. Delinting with sulphuric acid gave better control of the disease than any of the fungicides tested, of which only two, sanigran [? sanagran] and dow 9B, were of any value for late sowings. Sanagran at a dosage of 150 gm. per 100 kg. undelinted seed stimulates growth and flowering and is absolutely innocuous even at four times the prescribed strength. Dow 9B is effective at 100 gm. per 100 kg. seed; at higher rates it becomes harmful and it does not increase the yield to the same extent as sanagran. The Rogers Acala and Banda varieties proved to be the most susceptible to *X. malvacearum* in artificial infection studies and NT205/43 the least so, while Tigri D 61–G1 was intermediate in its reaction. The intensity of secondary infection of the stems and branches by way of the leaves seems to depend exclusively on gene B_2.

Blackarm and anthracnose are the most important causes of fibre deterioration in cotton sown at the normal time (up to the beginning of July), whereas late-sown crops (15th July to 1st August) sustain more damage from stigmatomycosis [internal boll disease: *Nematospora gossypii* and *N. coryli*: C.M.I. maps Nos. 153, 163]. *F. vasinfectum* and *Botryodiplodia theobromae* were isolated from cotton plants and seeds at Kuango. They failed to attack inoculated plants and were readily eliminated by the precautions adopted.

Blackarm was prevalent at the Station of Bébedjia (Lake Chad) except on N'Kourala, while *Ramularia* [? *areola*] was also very widespread but of little importance (pp. 41–42).

Sussman (A. S.). **Studies of an insect mycosis. II. Host and pathogen ranges.**—*Mycologia*, 43, 4, pp. 423–429, 1951.

In this further paper [cf. *R.A.M.*, 31, p. 64] the author states that of 20 representative species of *Aspergillus* tested, *A. flavipes*, *A. luchuensis* [loc. cit.], *A. flavus* [loc. cit.], *A. oryzae*, *A. parasiticus* [cf. ibid., 29, p. 294], and *A. tamarii* [cf. ibid., 8, p. 379] produced lethal infection in the cecropia moth *Platysamia cecropia*. Eight other genera were tested but only *Metarrhizium brunneum* [cf. ibid., 14, p.

443] and *Fonsecaea pedrosoi* var. *typicus* [*Phialophora pedrosoi*] and var. *communis* proved infective.

The host range of *A. flavus* was extended to include six more genera of the Lepidoptera.

Fisher (Fran[cine] E.). **An Entomophthora attacking Citrus red mite.**—*Florida Ent.*, 34, 3, pp. 83–88, 1 fig., 1951.

Fungus hyphal bodies and resting spores in citrus red mites (*Paratetranychus citri*), first observed by the author in 1948, have been identified as an *Entomophthora* sp. [*R.A.M.*, 30, p. 609], which is found throughout peninsular Florida south of Mount Dora to Avon Park and from east of Tampa to Fort Pierce. In all cases studied (to date) at Florida Citrus Experiment Station, Lake Alfred, mites moving slowly in a staggering or weaving manner were completely, or almost completely, filled with hyphal bodies. If the development of the fungus is favourable the body of the mite becomes somewhat distended, cheesy in consistency, and dark red or dark purple, occasionally with a greyish tinge, but under unfavourable conditions mites contain resting spores, are darker, and are usually very hard when cut with a needle. During September and October counts made in groves with heavy infestations showed adult mortalities ranging from 32 to 95 per cent.

Rockwood (L. P.). **Some hyphomycetous fungi found on insects in the Pacific Northwest.**—*J. econ. Ent.*, 44, 2, pp. 215–217, 1951.

The most prevalent hyphomycetous fungus found by the author on insects in the Pacific Northwest was *Beauveria bassiana* [*R.A.M.*, 30, p. 368], one of the hosts of which is the clover root borer, *Hyalastinus obscurus* [ibid., 21, p. 288]. A pleophagous species of *Beauveria*, distinguishable from the common *Spicaria gracilis* by its mealy covering of globose spore balls, has been collected on many ground insects, e.g., *Brachyrinus* spp., *Hypera punctata*, *H. nigrirostris*, *Hippodamia* spp., *Diabrotica undecimpunctata*, *Peranabrus scabricollis*, and *Sitora hispidula*. *Spicaria gracilis* forms a pure white, cottony covering over its hosts, which include the pea weevil (*Bruchus pisorum*) and *Autographa californica*, and its sporiferous layer is finely pulverulent and pure white in contrast to the ivory tint of *Beauveria bassiana*. The virulence of *S. gracilis* appears to be of a relatively low order, judging by the results of comparative inoculation experiments on *D. undecimpunctata* in 1933 with this species and *B. bassiana*, in which the latter produced 80 per cent. infection in 18 days and the former 46 per cent. in 30.

A secondary fungus parasitic on *B. bassiana* and *S. gracilis* was apparently identical with *Melanospora parasitica* [ibid., 5, p. 97]. Species of *Cephalosporium* have been found on the same two fungi and on various insects, but their parasitism on insects and that of *Aspergillus depauperatus* on aphids is regarded as doubtful. *Gibellula aranearum*, however, is probably pathogenic to spiders.

S. rileyi [ibid., 15, p. 719] does not occur in nature in the Pacific Northwest. In culture it was found to need a temperature above 70° F. for normal growth, whereas the common native species, *S. gracilis*, *Beauveria* spp., and *Metarrhizium* spp. throve in the fifties. Outdoor temperatures exceeding 70° usually develop only during the dry summer, so that *S. rileyi* would be unlikely to flourish in the region.

Zemit (V. E.). **On the immunity from rust of fibre Flax varieties.**—*Selection & Seed Growing, 1949*, 9, pp. 54–59, 1949. [Russian. Abs. in *Plant Breed. Abstr.*, 20, 2, p. 311, 1950.]

In 1943 the resistance of some flax varieties to rust [*Melampsora lini*: *R.A.M.*, 17, p. 441] in Russia declined with the appearance of a more virulent race. Svetoch [Torch], Tekstiljshchik [Textile Worker], Pobeditelj [Conqueror], and 1288_{12} were

the least susceptible. A new method of testing varietal resistance was developed at the Jaroslavlj Agricultural Institute, based on seed germination in extracts from the stems of diseased plants. Flax seed of the same variety but of different origin showed various degrees of resistance under Jaroslavlj conditions. The differences in susceptibility were heritable.

Millikan (C. R.). **Diseases of Flax and Linseed.**—*Tech. Bull. Dep. Agric. Vict.* 9, 140 pp., 91 figs., 5 graphs, 1951. [Mimeoprinted.]

This comprehensive review of the work on flax and linseed diseases, with particular reference to those occurring in Australia, includes the following items hitherto unpublished. Tests of sections of flax infested with rust (*Melampsora lini*) for 'free' phosphorus compounds [cf. *R.A.M.*, 23, p. 223] showed that they were present in both normal rust lesions and areas of 'false' browning [ibid., 24, p. 313], but not in healthy tissues.

Comparisons of the amount of mechanical damage to flax seed resulting from deseeding by means of the dual harvesting method with a header and by a Soenens type deseeder, made at the Flax Research Laboratory and by the Flax Production Committee, showed that although the header greatly increased the amount of mechanical damage the seed gave laboratory germination percentages comparable with those of undamaged samples. Under field conditions, however, the percentage was much lower, a discrepancy attributed to attack by soil fungi [ibid., 24, p. 370].

Foot rot, attributed in Western Australia mainly to *Fusarium culmorum* [cf. ibid., 30, p. 38], causes the premature death of plants scattered throughout the crops. They resemble those affected by *F. lini* [ibid., 29, p. 260] but dead stalks do not usually occur in extensive patches. The condition was more prevalent than usual in Victoria in 1947.

Polyspora lini [ibid., 24, p. 506; 27, p. 20; 30, p. 361] has been isolated from Victorian flax seed, the isolates inducing browning symptoms when inoculated into various flax and linseed varieties at the Plant Research Laboratory, Burnley. Examination of numerous seed samples by the Ulster method [see next abstract] revealed that the percentage of seed contaminated by the fungus was relatively low.

To date seedling blight or anthracnose caused by *Colletotrichum linicola* [C.M.I. map No. 159; *R.A.M.*, 27, p. 20] has been of only minor importance in Australia. It was first observed in Victoria in 1941 on seedlings from Rutherglen, and has occurred occasionally since in commercial crops and also at Burnley Gardens in plantings of several varieties of flax and linseed imported from the United States.

Mould damage to flax straw is associated with a species of *Septoria* (distinct from the *Septoria* state of *Sphaerella linorum* [ibid., 30, p. 558]), *Botrytis cinerea* [ibid., 23, p. 132], *Aspergillus* sp., *Mucor* sp., and *Alternaria* sp. [cf. ibid., 30, p. 360]. In laboratory tests the moulds tended to accelerate retting, particularly dew retting, except *Aspergillus* sp., which inhibited the growth of the retting bacteria and made the straw difficult to ret.

Studies on withertop caused by calcium deficiency [ibid., 23, p. 227; 24, p. 417] showed that fibre development was seriously retarded in stems grown in calcium-deficient sand cultures. In experiments to determine varietal reaction to withertop in artificially waterlogged soil 83 flax and linseed varieties developed symptoms. As there was some indication of individual differences in reaction to the disease in crops of Liral Crown and Concurrent in Victoria, plants were selected for withertop resistance. Liral Crown Selection 13 has shown very promising resistance in tests for several years and has been included as a parent in the Victoria flax-breeding project.

The symptoms of zinc deficiency [ibid., 27, p. 565; 30, p. 489] may include stem browning and die-back. Detailed anatomical studies showed that the irregular bronze spots, which appear at first on the upper leaf surface, were due to the

localized collapse of the upper epidermal cells. Later the cells below may become necrotic. A second type of leaf necrosis, originating in the petioles, starts in the parenchymatous tissue, the epidermal cells dying later. The vascular elements are the least affected of all the leaf tissues. Stem browning begins with the collapse of the parenchymatous cells of the cortex followed by the epidermal cells and lastly the vascular tissues, and often involves the bases of the associated petioles. Die-back commences with necrosis in the apical meristem. A definite correlation was found to exist between the severity of zinc deficiency symptoms and the phosphoric acid/zinc ratio of flax plants, the deficiency being best assessed from the early appearance of the plants rather than from final yields. In an experiment at Winchelsea during 1947 the same zinc and phosphate treatments were applied to flax and Dun field peas grown in an area previously occupied by flax uniformly affected by zinc deficiency. None of the peas showed any deficiency symptoms, while the flax was severely affected.

In times of drought the necrotic top of a plant may droop in a wide arc and secondary growth develops from the leaf axils immediately below. This symptom strongly resembles withertop, but in the latter case there is a sharp bend and the top hangs vertically downwards.

The account of each disease is followed by a comprehensive list of references.

Wallen (V. R.) & Skolko (A. J.). **A comparison of seed testing methods in relation to the stem-break and browning disease of Flax, caused by Polyspora lini Laff.**—*Canad. J. Bot.* (formerly *Canad. J. Res.*, Sect. C), 29, 2, pp. 138–142, 1 pl., 1951.

In an investigation made at the Central Laboratory of the Division of Botany and Plant Pathology, Ottawa, to compare the Ulster, Ottawa, and New Zealand methods of seed examination [*R.A.M.*, 24, p. 42; 27, p. 19, and preceding abstract] for the detection of *Polyspora lini* in flax seed the percentage of infection detected varied widely according to the method used. With lots of 1,000 seeds the Ulster method disclosed 9·2 per cent. infection, the New Zealand 21·7 and the Ottawa 2·6 or when it was supplemented by a centrifuge test (500 seeds) 24·3 per cent.; with a second batch (300, 200, 300, and 100 seeds, respectively) the corresponding infection percentages were 13, 54, 3, and 48. The low percentage of *P. lini* detected by the Ottawa method is due to the fact that the seed is sterilized first. The high percentage found by the New Zealand method is difficult to understand. A comparison of the percentages obtained by the combined Ottawa plate and centrifuge test and the New Zealand method showed fairly close agreement (26·9 and 21·7 per cent., respectively, in one sample and 51 and 54 per cent. in the other), the inference being that surface-borne *P. lini* is not removed by washing in tap water.

The Ulster method, though not differentiating deep-seated from superficial infection, proved satisfactory in actual practice with seed samples not seriously contaminated by saprophytes. The New Zealand method was not satisfactory. The Ottawa method does not indicate the degree of superficial infection but gives the percentage of deep-seated infection and so indicates the suitability of the seed for planting if treated with a fungicide. It is suggested that a centrifuge test combined with the Ottawa plating method would indicate whether or not seed treatment should be recommended. By plating the precipitate from the centrifuged sample, the viability and identity of *P. lini* could be verified.

Juliano (J. P.). **A study of the mosaic disease of Abacá, or Manila Hemp plant (Musa textilis Née), with special reference to sources of inoculum and possible transmission of the virus by mechanical means.**—*Philipp. Agric.*, 34, 3, pp. 125–132, 1951.

In experiments at the College of Agriculture, Los Baños, Laguna, Philippine

Islands, *Aphis gossypii* failed to transmit to *Musa textilis* the mosaic viruses from *Hippeastrum* sp., *Canna indica*, and banana [*R.A.M.*, 30, p. 378], nor did it convey the mosaic virus of *M. textilis* (*Marmor cucumeris*) [cucumber mosaic virus: loc. cit.] to cucumber. While *A. maidis* can transmit the maize mosaic virus to *M. textilis* and back again to maize, it proved unable to carry to *M. textilis* the grass mosaic from sugar-cane [sugar-cane mosaic virus: ibid., 29, p. 256] and *Paspalum conjugatum* or the mosaic of *Panicum* sp. Attempts at the mechanical transmission of cucumber mosaic virus to and from *M. textilis*, and of the viruses of several other plants besides those mentioned above to *M. textilis* were likewise unsuccessful. Hence control measures for the disease in the field will continue to be based on the known methods of spread, viz., (*a*) by four species of aphids (*A. gossypii*, *A. maidis*, *Rhopalosiphum nymphaeae*, and *R. prunifoliae*) from two sources of inoculum, *C. indica* and maize, and (*b*) by the use of suckers from superficially healthy but actually infected stools.

MacLean (N. A.). **Botrytis on Lilies.**—Abs. in *Phytopathology*, 41, 10, p. 941, 1951.

Two species of *Botrytis* have been reported to occur on lilies in North America, namely, *B. elliptica*, a primary parasite capable of causing severe leaf spotting and bulb rot, and *B. cinerea*, which also infects both leaves and bulbs, but only as a sequel to injury [*R.A.M.*, 29, p. 307]. Recently *B. liliorum* [ibid., 8, p. 607] was isolated [? in California] from *Lilium auratum* bulbs imported from Japan. This is believed to be the first record of the species in North America. The infected bulbs showed definite spotting and decay of the outer and inner scales, the latter in some cases having apparently been invaded by way of the stem.

MacLean (N. A.). **Gladiolus smut.**—Abs. in *Phytopathology*, 41, 10, p. 941, 1951.

Urocystis gladioli [*U. gladiolicola*] has recently been observed on cultivated *Gladiolus* seedlings [*R.A.M.*, 29, p. 307] in the Bay area of California, causing blistering, shredding, and necrosis of the stem and leaf tissues, all of which contained the characteristic smut balls of the fungus. Severe infection resulted in the death of the seedlings.

Gould (C. J.). **Till decay do us part.**—*Gladiol. Mag.*, 14, 3, pp. 2, 34–35, 38–40, 42, 44, 46, 48, 1950. [Abs. in *Biol. Abstr.*, 25, 4, pp. 1126–1127, 1951.]

The four chief *Gladiolus* rots in the United States are *Fusarium* brown rot [*F. oxysporum* f. *gladioli*: see next abstract], *Sclerotinia* dry rot [*S. gladioli*: loc. cit.], *Botrytis* wet rot [*B. gladiolorum*: *R.A.M.*, 30, p. 230], and scab [*Bacterium marginatum*: cf. ibid., 30, p. 161]. Tables showing the probable losses from rot in eight important *Gladiolus*-growing localities indicate that 40 to 71·5 per cent. of the corms would be lost if no control practices were applied; present losses are 7 to 25·5 per cent. Control measures include proper cultural practices and sanitary precautions, curing at 80° to 85° F. at 80 per cent. or more humidity, prompt cleaning, return to 80° until the base has healed, and subsequent storage at 40° to 50°. Chemical controls vary in effectiveness in different regions.

Gould (C. J.). **New developments in disease control.**—*Gladiol. Mag.*, 14, 1, pp. 41–44, 1950. [Abs. in *Biol. Abstr.*, 25, 4, p. 1126, 1951.]

Gladiolus rot due to *Fusarium* [*oxysporum* f. *gladioli*: cf. *R.A.M.*, 30, p. 107 and preceding abstract] can be controlled by post-harvest dips in spergon, dowicide A, or dowicide B for bruised or heavily infected stock, by pre-storage dusts (dow 9B, ferradow or fermate, and DDT mixture, and spergon and DDT), and by preplanting treatments, including dowicide 9B, ceresan, lysol, spergon, tersan, and arasan. Dry rot [*Sclerotinia gladioli*: loc. cit. and ibid., 30, p. 469] is controlled fairly well

by puraturf 177, tersan, arasan, ceresan, lysol, and supergermite. Spread of mosaic [ibid., 30, pp. 404, 416] can be reduced by isolating new stocks, growing *Gladiolus* away from *Freesia* and legumes, and controlling aphids.

BAILEY (F. V.). **Observations on varietal resistance to Chrysanthemum rust.**—*J.R. hort. Soc.*, 76, 9, pp. 322–328, 1 fig., 1 chart, 1951.

A study conducted at University College, Exeter, on the life-cycle of *Puccinia chrysanthemi* [C.M.I. map No. 117] showed that infection is confined to varieties of the cultivated chrysanthemum and allied species. Teleutospores are seldom found in Britain [*R.A.M.*, 23, p. 179]. The mycelium which develops from the uredospore is intercellular with haustoria, and is generally restricted to the leaf tissues, but severe foliar infection is sometimes accompanied by slight infection of the stems in certain varieties and occasionally of the involucre. The large intercellular spaces of the spongy mesophyll become filled with a mass of hyphae, some of which pass into the palisade layer, where the hyphal ends lie perpendicular to the leaf surface closely pressed between the cells. The mycelium as seen in a surface view of the leaf radiates uniformly in a densely branching mass from a central point which becomes the centre of the uredosorus. Where vascular tissue intervenes the hyphal mass becomes discontinuous and a few sparsely branching hyphae circumvent the vascular strand by growing between the epidermis and the bundle sheath and give rise to a smaller, fan-shaped hyphal mass on the other side. This effect is also visible externally upon sorus formation, when many sori appear to be divided by veins. Unbranched hyphae also extend beyond the central mass to form secondary growth centres from which secondary sori arise. A third mycelial ring with tertiary sori is not uncommon, and in some varieties up to six rings may occur. Uredosori develop in not less than 20 days (usually three to four weeks) after inoculation with uredospores, and secondary uredosori two weeks later. Germination takes place after eight to nine hours' contact with moisture, and 100 per cent. humidity is essential. On a chrysanthemum leaf the germ-tube penetrates a stoma.

In resistance tests [cf. ibid., 17, p. 460] *Chrysanthemum rubellum* was very susceptible, and *C. indicum* var. *azaleanum* and *C. makinoi* susceptible, while *C. coronaria*, *C. segetum*, *C. leucanthemum*, *C. maximum*, *C. parthenium*, *C. viscosum*, *C. myconis*, *C.* [*Tanacetum*] *vulgare*, and *Matricaria inodora* were immune. In a test with 44 varieties [ibid., 8, p. 243], sprayed with water, dusted with a mixture of uredospores and talc, kept in a saturated atmosphere for two days, and then set out at random in an experimental plot, 5 to 9 per cent. infection (as estimated by the percentage of leaf area covered by sori, according to six graded standards) was shown by Baldock Crimson [ibid., 17, p. 181], Bronze Paine, Market Gold, American Beauty, Jean Ingamells, Christmas Gold, Louis Barthon, Winter Sun, Christmas Red, Magnet, Barbara, and Coldham Pink, listed in decreasing order of susceptibility. Under 5 per cent. was shown by White Wonder, Late Delight, and October Red. Less than 50 per cent. infection on a single leaf may usually kill it, but the percentage leaf infection does not always reflect the economic damage. Thus, Friendly Rival and American Beauty with 8·2 and 16·2 per cent. leaf infection, respectively dropped 35 and 27·4 per cent. of their leaves.

KELLER (J. R.). **Report on indicator plants for Chrysanthemum stunt virus and on a previously unreported Chrysanthemum virus.**—*Phytopathology*, 41, 10, pp. 947–949, 1 fig., 1951.

The information herein presented on the chrysanthemum stunt and Q viruses, both involved in crinkle disease at Cornell University, New York, has already been noticed from another source [*R.A.M.*, 30, p. 162].

Lépine (P.), Croissant (Mlle O.), Cornuet (P.), & Martin (C.). **Essais d'extraction du virus de la mosaïque du Dahlia (Marmor dahliae Holmes) et examen au microscope électronique des produits obtenus.** [Experiments in the extraction of *Dahlia* mosaic virus (*Marmor dahliae* Holmes) and examination by the electron microscope of the products obtained.]—*Ann. Inst. Pasteur*, 80, 6, pp. 669–672, 1 fig., 1951.

Various helpful modifications in the method of *Dahlia* mosaic virus extraction are described from the Institut Pasteur, Paris [*R.A.M.*, 30, p. 231]. The difficulty hitherto experienced in the mechanical transmission of the virus from diseased to healthy *Dahlia* plants is essentially attributable to the presence in the juice of denaturing agents with the properties of tannins [cf. below, pp. 123, 149] liberated simultaneously with the virus in the process of grinding. The high percentage of transmissions obtained by Brierley and Smith with *Verbesina encelioides* and *Zinnia elegans* [see next abstract] may well be connected with the absence of inhibitors in these plants.

Brierley (P.) & Smith (F. F.). **Some vectors, hosts, and properties of Dahlia mosaic virus.**—*Plant Dis. Reptr*, 34, 12, pp. 363–370, 1 fig., 1950. [Multilithed.]

Studies at Beltsville, Maryland, demonstrated that dahlia mosaic virus [*R.A.M.*, 30, p. 231 and preceding and next abstracts] obtained from tolerant Jersey's Beauty is acquired during a one-minute feeding period and persists in the vector, *Myzus persicae*, for three hours or less. It was also transmitted by *Aphis fabae*, *A. gossypii*, *M. convolvuli*, and *Macrosiphum solanifolii*. When inoculated *Sanvitalia procumbens*, *Verbesina encelioides*, and *Zinnia elegans* developed symptoms similar to those expressed by dahlia; *Coreopsis douglasii* acted as a symptomless carrier. The virus was transmitted with difficulty from dahlia to dahlia by leaf rubbing, but readily from zinnia to zinnia and from *Verbesina* to *Verbesina* by this method. It was not transmitted to cucumber by *Myzus persicae*, nor was cucumber mosaic virus transmitted to dahlia by this vector or by leaf-rubbing. Dahlia mosaic failed to protect zinnia from infection by Price's tester strain of cucumber mosaic [ibid., 14, p. 812]. The physical properties of dahlia mosaic virus, determined in *Verbesina*, are thermal inactivation between 85° and 90° C.; dilution end point above 1 in 3,000; infectious in drying leaves after 10 days but not after 14; and infectious in crude sap extract stored at 18° C. after 28 days but not after 35.

Brierley (P.). **Value of index plants for detecting Dahlia viruses.**—*Plant Dis. Reptr*, 35, 9, pp. 405–407, 1951. [Multilithed.]

Further studies on dahlia mosaic virus [see preceding abstracts] were made to determine whether *Zinnia elegans* and *Verbesina encelioides*, which express well-defined symptoms when infected, were sufficiently sensitive to serve as indicator plants for the virus. In the first series of tests inoculated Golden Gem Midget zinnias developed dwarfing with marked downward curling of the leaves, whereas cucumber mosaic virus produced slight transitory curling and vein-clearing [cf. ibid., 14, p. 812]. In *Verbesina* dahlia mosaic virus induced vein-clearing in about ten days followed by prominent vein mosaic with crinkling and downward leaf curling, while cucumber mosaic symptoms were much milder, consisting of diffuse mottling with only occasional vein-clearing and no leaf distortion.

In the second series later in the season *Verbesina* responded as well as in the first; zinnia failed to respond. The presence of cucumber mosaic virus in three dahlias with inconspicuous symptoms (of 18 indexed) indicates that they may serve as unsuspected sources of the virus [ibid., 27, p. 588], both this and the mild form of dahlia mosaic apparently passing unnoticed in the garden.

Davis (Lily H.). **The Heterosporium disease of California Poppy.**—Abs. in *Phytopathology*, 41, 10, p. 937, 1951.

Heterosporium eschscholtziae has been known in California since 1884, but not until 1947 did it severely reduce seed yields of commercial California poppy [*Eschscholtzia californica*]. The fungus may form irregular, brown to black lesions on the leaves, stems, receptacle, calyptra, and fruit, or even kill the seedlings. In advanced stages of infection the leaflets wither and the production of brown cankers at soil-level results in decay and shrivelling of the tap-root. The mycelium may penetrate the capsule at its point of attachment, inducing no external symptoms, and ramify profusely through the interior of the fruit, killing young seeds and adhering to their surfaces or penetrating the testa of mature ones. The mycelium passes through the outer parenchymatous layers of green seeds into the crystal layer, which is frequently disorganized, and thence into the embryo. Once the crystal layer cells reach maturity they seem to constitute a barrier excluding all but occasional strands of mycelium. In ripe seeds, therefore, infection is commonly restricted to the epidermis and the compressed parenchyma layers. The fungus may be effectively eliminated from seeds by half-an-hour's immersion in water heated to 125° F.

Noordam (D.), Thung (T. H.), & Van der Want (J. P. H.). **Onderzoekingen over Anjermozaiëk, I.** [Investigations on Carnation mosaic, I.]—*Tijdschr. PlZiekt.*, 57, 1, pp. 1–15, 6 figs., 1951. [English summary.]

The symptoms of carnation mosaic virus [*R.A.M.*, 23, p. 19; 30, p. 468] in Holland consist of yellowish to grey-brown, often coalescent spots on the leaves, sometimes with necrotic centres, stunting, and reduction in the number and quality of the flowers. Infection of young plants results in curling or distortion as the leaves grow older. Pale green spots, streaks, or rings often appear on the young foliage. These features are characteristic of Peter Fisher and most other varieties, but in Puritan and Orchid Beauty a purple discoloration of the tissue surrounding the lesions has been observed.

The results of grafting experiments carried out at Aalsmeer demonstrated the transmissibility of the virus. Inoculated into *Dianthus barbatus* leaves, the sap of mosaic-diseased carnations produced buff-coloured to whitish, often concentric rings after four to eight days, followed within the next week by systemic symptoms in the form of small, ring-like markings or irregular, yellowish-green discolorations. Inoculated leaves of aster (*Callistephus* sp.) and White Burley tobacco developed a few necrotic spots, sometimes encircled by a concentric ring. Only one out of ten asters subsequently showed systemic symptoms, consisting of vein-clearing and fine, necrotic spots. None of the tobacco plants was similarly affected. *D. barbatus* leaves inoculated from the aster and tobacco spots reacted as described above, but tobacco plants treated in the same way again developed only local lesions. Sap from the latter was used for the inoculation of the first leaves of young Double White Stringless bean (*Phaseolus vulgaris*) plants, all of which displayed dark-coloured local lesions within a week and most became affected within three weeks by a systemic necrosis closely resembling bean stipple streak (tobacco necrosis virus) [ibid., 28, p. 645]. The same local symptoms developed on beans inoculated with juice from *D. barbatus* systemically infected with the carnation virus, but only one out of five plants contracted stem necrosis.

Carnations raised from seed in steamed soil were inoculated with (*a*) mosaic-infected *D. barbatus* sap, (*b*) sap from tobacco leaves infected with carnation mosaic virus after passage through aster, or (*c*) after passage through tobacco. After a week some of the plants showed slight, local, yellowish-brown discolorations, sometimes accompanied by reddish-brown spots. Three weeks later mosaic symptoms were observed on the top leaves of some of the plants, and later most of

the younger foliage was distinctly affected. Sap inoculation of *D. barbatus* showed that all the inoculated plants had contracted infection. Passage through this host, tobacco, or aster is evidently, therefore, without effect on the pathogenicity of the virus to carnation.

The thermal inactivation point of the virus was found to lie between 80° and 90° C., and its dilution end point beyond 10^{-5}. Electron micrographs of the virus, partially purified with ammonium sulphate (without loss of infectivity), revealed spherical particles, mostly about 33 mμ; some measuring only 17 mμ may represent another virus. One of the two components shown by the sedimentation diagram had a sedimentation constant of 108×10^{-13}, corresponding to a molecular weight of about 6,000,000, while the molecular weight of the other was estimated at 2,000 to 10,000. The latter is probably identical with the normal proteins not separated by the method of purification employed and possibly acting as antigens. An anti-serum against the virus prepared by the injection of rabbits with a partially purified preparation had to be saturated with juice from healthy carnation plants before use, whereupon it reacted strongly with diseased material. The formation of a bulky precipitate is also indicative of the presence of spherical virus particles.

Van der Want (J. P. H.). **Onderzoekingen over Anjermozaiëk, II.** [Investigations on Carnation mosaic, II.]—*Tijdschr. PlZiekt.*, 57, 2, pp. 72–74, 1951. [English summary.]

In further studies on carnation mosaic virus [see preceding abstract] the sap of healthy carnation plants was found to carry a factor inhibiting the transmission of certain viruses to the test plants used. For instance, all attempts to transmit a mixture of equal parts of tobacco necrosis virus, isolated from a necrotic tulip [*R.A.M.*, 29, p. 539], and healthy carnation sap to carnation or *D. barbatus* have hitherto been unsuccessful, while negative results were also given by similar experiments with tobacco mosaic virus on *Nicotiana glutinosa* and rattle virus [ibid., 30, p. 506] on White Burley tobacco. In contradistinction to such 'absolute' inhibitors as the tannins in *Dahlia*, which tend to prevent the mechanical transmission of Dahlia mosaic virus to its own host and other plants [see above, p. 121], the factor carried by healthy carnations may be described as a 'relative' inhibitor.

Arx (J. A. v.) & Noordam (D.). **Valse meeldauw (Peronospora pulveracea Fuckel) op Helleborus niger.** [Downy mildew (*Peronospora pulveracea* Fuckel) on *Helleborus niger*.]—*Tijdschr. PlZiekt.*, 57, 1, pp. 32–35, 2 figs., 1951. [German summary.]

The hothouse cultivation of *Helleborus niger* in Holland is seriously hampered by outbreaks of downy mildew (*Peronospora pulveracea*) [*R.A.M.*, 4, p. 480], which induces precocious flowering and imparts an unsightly greyish-brown discoloration to the petals in addition to stunting and irregular marginal curling. The Buis variety sustains heavy damage from the disease, to which Keessen is highly resistant. Repeated applications of 1·5 per cent. Bordeaux mixture proved ineffectual.

Zobrist [L.] & Markwalder. **Fortschritte in der Bekämpfung des Begonien Mehltaues.** [Progress in the control of Begonia mildew.]—*Gärtnermeister*, 53, pp. 141–143, 1950. [Abs. in *Hort. Abstr.*, 20, 3, p. 254, 1950.]

A fortnightly spray with 0·1 per cent. forsal plus 0·4 per cent. deril is suggested as an improved control measure against begonia mildew [*Oidium begoniae*: *R.A.M.*, 27, p. 422; 30, p. 232] in Switzerland instead of the cupro-deril wash used hitherto

[ibid., 25, p. 343]. The new wash is also successful with hydrangeas, calceolarias, cinerarias, azaleas [*Rhododendron* sp.], and geraniums [*Pelargonium* sp.].

GÄUMANN (E.). **Puccinia baldensis n.sp.**—*Ber. schweiz. bot. Ges.*, 61, pp. 46–48, 1951. [German.]

Puccinia baldensis n.sp. was found on Mt. Baldo, Lake Garda, Italy, producing its aecidia on *Senecio brachychaetus* and uredo- and teleutosori on *Poa pratensis*. The globose or ellipsoid aecidiospores measure 19 to 29 by 13 to 23 μ, the globose or ovoid uredospores 19 to 37 by 13 to 25 (mostly 24 to 28 by 19 to 23) μ, and the pale yellow, variable, usually clavate teleutospores 40 to 68 by 11 to 20 (50 to 60 by 14 to 17) μ. The rust differs from *Puccinia poarum* [*R.A.M.*, 25, p. 389] in the occurrence of paraphyses in the uredo- and teleutosori, the much larger uredospores, and the narrower teleutospores.

SMITH (D. C.) & NIELSEN (E. L.). **Comparisons of clonal isolations of Poa pratensis L. from good and poor pastures for vigor, variability, and disease reactions.**—*Agron. J.*, 43, 5, pp. 214–218, 1951.

Clonal isolations of *Poa pratensis* from some 50 sod samples from each of ten representative pastures in southern Wisconsin were examined for uniformity of type, relative vigour, and reactions to powdery mildew (*Erysiphe graminis*) and rust (*Puccinia poae-sudeticae*) [*P. poae-hemoralis*: *R.A.M.*, 30, pp. 274, 602]. Significant differences occurred among the types of pasture in reaction to the two diseases. Thus, two samples of moderately grazed, good lowland harboured 27 and 78·2 per cent. mildew and 93·9 and 87·3 per cent. rust; lightly, moderately, and heavily grazed, good upland 13·4, 66, and 47 per cent. mildew and 74, 87·5, and 88·3 per cent. rust, respectively; heavily grazed fair and poor upland 87·5 and 45·2 per cent. mildew and 94·4 and 80·4 per cent. rust, respectively; wooded, lightly grazed, poor upland 78·7 per cent. mildew and 84·1 rust; wooded, heavily grazed, poor slope 74·1 and 75·4 per cent., respectively; and moderately grazed, very poor, steep slope 88·2 and 89·5 per cent., respectively. The averages of mildew and rust for the ten samples were 60·7 and 85·7 per cent., respectively. No close correlation could be established between these data and the soil type, available moisture, and management.

MYERS (W. M.). **Registration of varieties and strains of Bromegrass (Bromus spp.)**—*Agron. J.*, 43, 5, pp. 237–238, 1951.

Bromar Mountain Bromegrass (Reg. No. 1) was derived from a mass selection from *Bromus marginatus* seed collected in 1933 at the Washington Agricultural Experiment Station. It is well adapted to short rotations for joint cultivation with sweet clover [*Melilotus* spp.] in the Northwest and is highly resistant to head smut [*Ustilago bullata*: *R.A.M.*, 29, p. 566].

Martin Smooth Bromegrass (Reg. No. 2), derived from *B. inermis*, is prolific and relatively free from leaf diseases.

MYERS (W. M.). **Registration of varieties and strains of Bermuda Grass (Cynodon dactylon (L.) Pers.)**—*Agron. J.*, 43, 5, p. 240, 1951.

Coastal Bermuda grass (*Cynodon dactylon*) has been developed in co-operative investigations between the Georgia Coastal Plain Experiment Station and the Division of Forage Crops and Diseases, United States Department of Agriculture, from one of 147 selections from over 5,000 plants representing the vegetative increase of a single F_1 plant obtained in 1938 from seed of the Tift variety interplanted with two tall-growing introductions from South Africa. It is more resistant than common Bermuda grass to *Helminthosporium giganteum* [*R.A.M.*, 10, p. 233] and has exceeded it in hay yield by over 100 per cent.

Hollowell (E. A.). **Registration of varieties and strains of Red Clover, II.**—*Agron. J.*, 43, 5, p. 242, 1951.

Kenland, Reg. No. 3 clover, is a double cut or medium type which has shown a high degree of resistance to southern anthracnose (*C[olletotrichum] trifolii*) and some resistance to crown rot (*Sclerotinia trifoliorum*) in Kentucky. It is, however, susceptible to northern anthracnose (*Kabatiella caulivora*) [cf. *R.A.M.*, 23, p. 22].

Helson (G. A. H.). **The transmission of witches' broom virus disease of Lucerne by the common brown leafhopper, Orosius argentatus (Evans).**—*Aust. J. Sci. Res.*, Ser. B, 4, 2, pp. 115–124, 5 pl., 2 figs., 1951.

Orosius argentatus [*R.A.M.*, 30, p. 215], the vector of the witches' broom virus disease of lucerne [ibid., 30, p. 47], has been used in transmission experiments in New South Wales and the Australian Capital Territory. The disease was found to be transmitted by groups of virus-free individuals reared under experimental conditions, after having been fed on a lucerne plant infected with it. Beet, *Datura stramonium*, *Erodium cicutarium*, *Hypochaeris radicata*, tomato, lucerne, and *Vinca rosea* were all infected with the virus under experimental conditions, but the infection of lucerne was difficult because this plant is not a preferred host, the leafhopper cannot breed on it, and dies if kept on it for more than one or two days without an alternate host plant; the first symptoms appeared only after about seven months. The usual symptoms developed on all the plants [ibid., 26, p. 61; 30, p. 19], those on tomato and other hosts resembling closely the tomato big bud virus. It is suggested that this disease and witches' broom, both transmitted by the above-mentioned vector, may be caused by the same or closely related strains of virus.

Bingefors (S.). **Sambandet mellan väderleks förhållandena och omfattningen av Klöverrötangreppen vid Ultuna under åran 1930–1950.** [Correlation between weather conditions and the extent of Clover rot infection at Ultuna during the years 1930 to 1950.]—*Sverig. Utsädesfören. Tidskr.*, 61, 3, pp. 100–107, 2 graphs, 1951. [English summary.]

A study of the incidence of clover rot (*Sclerotinia trifoliorum*) [*R.A.M.*, 29, p. 621; 30, p. 274] in relation to weather conditions covering the period of the red clover strain trials at the Ultuna branch of the Swedish Seed Association from 1930 to 1950 revealed severe damage from this source during the first decade, after which little trouble was experienced until the two closing years, when heavy infection occurred. A fairly close correlation was established between mild November to December weather and virulence of the disease, which failed to develop when the ground was frozen to a considerable depth for a large part of the winter. A heavy autumn rainfall seems to be of less importance than a favourable temperature in the release of a clover rot epiphytotic. On the other hand, abundant precipitation at midsummer may promote the onset of infection as early as the late summer.

Pettinari (Carla). **Una macchiettatura delle Mele.** [A spotting of Apples.]—*Ann. Sper. agr.*, N.S., 5, 3, pp. 559–569, 2 pl., 1951. [English summary.]

During the winter and spring of 1950 many consignments of winter varieties of apple commonly grown in Italy developed circular spots, leather-brown at the centre with outer rings of pale hazel, from which were obtained colonies of *Alternaria tenuis* [cf. *R.A.M.*, 16, p. 619; 25, p. 493; 30, p. 522]. Perithecia were formed in pure culture and are regarded as a new form of *Pleospora alternariae* [cf. ibid., 11, p. 77; 14, p. 724], which is named *P. alternariae* f. *fusca*. It is distinguished by the association of perithecia in groups of three or more, scarcity or absence of paraphyses, and monostichous arrangement of ascospores.

Berducou (Jeanne). **Mutation de Nectria galligena traitée par l'hétéroauxine.** [Mutation in *Nectria galligena* treated with heteroauxin.]—*C.R. Acad. Sci., Paris*, **232**, 12, pp. 1230–1232, 1 fig., 1951.

After $2\frac{1}{2}$ months of suspension of growth due to the presence in the medium (Knop's solution at half strength) of β-indoleacetic acid (heteroauxin) at dosages of 20 to 500 mg., cultures of *Nectria galligena* [*R.A.M.*, 30, p. 166] containing 250 mg. of heteroauxin resumed development, and a fortnight later the coralloid mycelium had attained a diameter of 1·5 and a height of 1 cm. The following morphological differences were observed between the treated and untreated cultures: in the former the width of the hyphae was 2·8 to 6 μ and in the latter 1·4 to 3 μ, the length of the segments ranging from 9 to 20 and 10 to 30 μ, respectively; the chlamydospores measured 8 to 9 and 5 to 6 μ, respectively; and the treated cultures contained terminal or intercalary vesicles, the function of which is not altogether clear. These changes were maintained for over nine months from the beginning of April, 1950, and would thus appear to represent a true mutation.

Najjar (H.). **The European Apple tree canker.**—*Circ. Ext. Serv. Minist. Agric. Damascus* 39, 8 pp., 1949. [Arabic, with English summary. Abs. in *Hort. Abstr.*, 20, 4, p. 352, 1950.]

Apple canker (*Nectria galligena*) causes severe damage to some varieties in Syria [C.M.I. map No. 38]. Entrance holes of the *Zeuzera* borer [*Z. pyrina*] are often associated with the disease.

Vlasveld (W. P. N.). **Het schurftonderzoek in de jaren 1947 en 1948 en de waarnemingen in 1949.** [Scab investigation in the years 1947 and 1948 and the observations in 1949.]—*Tijdschr. PlZiekt.*, 57, 1, pp. 15–32, 4 graphs, 1951. [English summary.]

This is a progress report on the incidence of apple scab (*Venturia inaequalis*) in Holland from 1947 to 1949, with special reference to the timing of spray applications by the spray warning service, which since 1948 has been in the hands of the Phytopathological Service [*R.A.M.*, 30, p. 140]. The warnings are based on the development of (*a*) the fungus (as determined by ascospore discharges) and (*b*) the tree buds [ibid., 27, p. 426], as well as on weather forecasts, which are not, however, uniformly applicable to all parts of the country.

The causes of the severe epiphytotic of 1949 [ibid., 30, p. 46] are discussed. Many poor results of spraying are attributed to the very protracted flowering period, resulting in an unduly long interval between the last pre- and the first post-blossom application. Under such conditions treatment of the trees during blossoming with sulphur (preferably wettable) would probably be advisable. Copper and mercury compounds are used for pre-blossom applications. The mercurials impart smoothness to the fruits and improve the appearance of the foliage, hence their increasing use despite a comparatively weak fungicidal action. The expensive thiram preparations [ibid., 31, p. 67] are less toxic to *V. inaequalis* than the other sprays, but since they greatly improve the look of the foliage and the colour of the fruits they may be applied for the last two or three treatments before picking.

Jaivenois (A.). **Les traitements préfloraux.** [Pre-blossom sprays.]—*Fruit belge*, 18, pp. 53–54, 1950. [Abs. in *Hort. Abstr.*, 20, 3, p. 209, 1950.]

Pre-blossom fungicidal sprays recommended for Belgian orchards include neutral Bordeaux mixture containing 1·5 per cent. copper sulphate for apples and pears highly susceptible to scab [*Venturia inaequalis* and *V. pirina*, respectively: *R.A.M.*, 26, p. 306], and pre-blossom lime-sulphur only for apple varieties highly sensitive to spray damage.

Gagnotto (Anna V.). **Osservazioni su un cancro dei rami di Pero.** [Observations on a canker of Pear branches.]—*Ann. Sper. agr.*, N.S., 5, 3, pp. 489–497, 5 figs., 1951. [English summary.]

Pear trees 10 to 15 years old growing at Trecastagni, Sicily, developed a canker of the branches caused by a fungus provisionally referred to *Cylindrocarpon mali* [cf. *R.A.M.*, 23, p. 444]. Conidia were 5- to 6-septate and were 45 to 60 μ long; in culture on Czapek agar they were 1- to 5-septate, averaged 5·5 μ in diameter, and ranged in length from 13 to 25 μ (1-septate) to 44 to 55 μ (5-septate). Inoculations of wounded pear branches resulted in infection and the fungus was reisolated.

Injury was appreciably reduced by frequent spraying with Bordeaux mixture.

Maltschewsky (N.). **Über die Anpassungsfähigkeit von Azotobakter chroococcum. III. Mitteilung : Azotobakter als Ursache des Obstverderbs.** [The adaptability of *Azotobacter chroococcum*. III. *Azotobacter* as the cause of fruit rot.] —*Z. PflErnähr. Düng.*, 47, pp. 249–256, 1949. [Abs. in *Hort. Abstr.*, 20, 3, p. 208, 1950.]

The brown tissues of rotted pears [in Germany] were found to contain *Azotobacter chroococcum* [*R.A.M.*, 15, p. 395] in various forms, its pathogenicity being confirmed by inoculation experiments. In view of the adaptability of *Azotobacter* to various nutritional conditions the organism may be of greater importance in agriculture than was hitherto suspected.

Sushickiy (L. A.). **The preparation of copper naphthenate.**—*Sad i Ogorod* (*Orchard and Garden*), *1950*, 2, pp. 25–26, 1950. [Russian. Abs. in *Hort. Abstr.*, 20, 3, p. 217, 1950.]

Details are given of the preparation of copper naphthenate which is said to be widely used [in U.S.S.R., see below, p. 166] as a substitute for Bordeaux mixture in the control of diseases such as apricot brown rot [*Sclerotinia fructigena* and *S. laxa*: cf. *R.A.M.*, 29, p. 102] and *Clasterosporium* leaf spot [*C. carpophilum*] of stone fruit trees.

Lindner (R. C.), Weeks (T. E.), & Kirkpatrick (H. C.). **Studies on a color test for stone fruit virus diseases.**—*Phytopathology*, 41, 10, pp. 897–902, 1 graph, 1951.

Colorimetric methods for the detection of virus diseases in stone fruit trees [cf. *R.A.M.*, 31, p. 68], based on the accumulation of polyphenols in infected tissue, have already been described [ibid., 29, pp. 312, 602]. Although leaf tissue appears to be the most generally suitable material for virus tests on cherry trees, wood also gives satisfactory readings and may be used during the dormant season; wood is, in fact, preferable to leaves for the diagnosis of the 'latent complex' (a term used to denote an unknown number of viruses producing meagre or imperceptible symptoms) [ibid., 24, p. 236] in peach or [*Prunus*] *mahaleb* trees. The method used for wood samples, which are obtained from current season terminal growth, is essentially the same as that for leaves, except that the heating period is extended to 30 minutes in a water bath at 80° C. The chief limitation of the chemical test lies in the impracticability of determining the exact identity of the one or more viruses present in the stone-fruit hosts. From the results of some 70,000 tests at the Tree Fruit Experiment Station, Wenatchee, Washington, it appears that few or no peach or cherry trees are virus-free. Components of the latent complex were apparently transmitted through over 90 per cent. of Mazzard cherry, *P. mahaleb*, and peach seeds.

KATAJIMA (H.). **Studies on the dissemination of Peach anthracnose II.**—*Ann. phytopath. Soc. Japan*, 15, 2, pp. 67–71, 6 figs., 2 diags., 1951. [Japanese, with English summary.]

Peach twigs infected by *Gloeosporium laeticolor* [*R.A.M.*, 19, p. 262] in Japan usually die in March and conidia may be produced on them in April. Primary infection occurs on the trichomes of young fruits, on which the conidium germinates about 12 hours after deposition, forming an appressorium and penetrating the cell wall. Two days or so later acervuli develop over the surface of the trichomes, which turn brown and are readily blown away by the wind and are therefore an important source of secondary infection to the young fruit and tissue elsewhere. Young peach leaves and nectarine fruits may be invaded by *G. laeticolor* without the formation of appressoria. Light brown or pale salmon-coloured, mucilaginous acervuli develop on the young fruits 48 hours after inoculation; on the leaves they are faded brown and pulverulent. Infection may be contracted at any time between May and August in wet weather, when the conidia become suspended in rain droplets which are splashed by the wind over the fruits, infection spreading in the form of a cone, as described by Dunegan [in connexion with *Xanthomonas pruni*: ibid., 11, p. 583]. Conidia fallen on the ground may remain viable for about seven days in the summer.

DAVIS (D.), HENDERSON (L. M.), & POWELL (D.). **The niacintryptophane relationship in the metabolism of Xanthomonas pruni.**—*J. biol. Chem.*, 189, 2, pp. 543–549, 1 graph, 1951.

In a joint investigation of the Divisions of Plant Pathology and Biochemistry, University of Illinois, a pure culture of *Xanthomonas pruni* from peach on Starr's medium (modified) [*R.A.M.*, 25, p. 292] proved capable of utilizing tryptophane and other postulated niacin (nicotinic acid) precursors to satisfy its requirements for this vitamin. The complete interchangeability of niacin and tryptophane for growth suggests that the pathogen needs the former for the synthesis of the latter.

KOTTE (W.). **Die Schmalblättrigkeit der Süsskirsche (Pfeffingerkrankheit) auch in Deutschland.** [The narrow leaf disease of sweet Cherry (Pfeffinger disease) in Germany too.]—*Phytopath. Z.*, 17, 4, pp. 468–471, 5 figs., 1951.

The 'Pfeffinger' virus disease of sweet cherries recently reported from Switzerland [*R.A.M.*, 30, p. 50 and next abstract] has also been observed in the adjacent areas of southern Baden, Germany. So far it has involved only about 15 young trees, all of which have been removed.

MULDER (D.). **De Eckelrader virusziekte van zoete Kersen.** [The Eckelrade virus disease of sweet Cherries.]—*Meded. Direct. Tuinb., Wageningen*, 14, pp. 217–228, 4 col. pl., 4 figs., 1951. [English summary.]

The most prominent features of a disease first observed in 1946 on a sweet cherry tree of the French Wine variety at Eckelrade, South Limburg, Holland, and now known as 'Eckelrade disease', are enations on the lower surfaces of the leaves, pronounced dentation, rosette formation, twig die-back, malformation, and little leaf. The disease, confined to sweet varieties and particularly severe on Abbesse de Mouland and Bigarreau Napoleon, presents clear-cut analogies with the 'Pfeffinger' disease reported from Switzerland [and Germany: see preceding abstract]. Several viruses are believed to be concerned in the etiology of 'Eckelrade disease', one of them most probably being rasp leaf [see above, p. 105], also responsible for leaf enations. So far the disease appears to be spreading slowly, most likely only through cultural operations, such as budding and grafting, and has seldom been detected in nurseries. Attempts are in progress to control the Eckel-

rade virus by stringent supervision in the nursery, diseased trees not being used for taking scions.

Parker (K. G.) & Cochran (L. C.). **Similarities of symptoms produced by the viruses causing ring spot of Peach and necrotic ring spot of sour and sweet Cherry.**—Abs. in *Phytopathology*, 41, 10, p. 942, 1951.

Montmorency cherry trees and Mazzard cherry seedlings grown in New York from seed of healthy trees were planted at Riverside, California, and inoculated with [peach] ring spot virus [*R.A.M.*, 30, p. 276; 31, p. 21] from several sources. Separate lots of Montmorency inoculated with the virus from peach orchards, or from Duke cherry collected in southern California, developed symptoms identical with those usually produced by sour cherry inoculum [ibid., 30, p. 572] in New York. The symptoms produced on Montmorency inoculated with virus from sweet cherry in southern California were more severely necrotic than usual, resembling those sometimes associated in New York with necrotic ring spot. Mazzard seedlings inoculated by budding from the same virus sources, as well as from cultures obtained from sweet cherry in Oregon, contracted symptoms like those produced in New York by the necrotic ring spot virus from sour cherry.

McClure (T. T.) & Cation (D.). **Comparison of actidione with some other spray chemicals for control of Cherry leaf spot in Michigan.**—*Plant Dis. Reptr*, 35, 9, pp. 393–395, 3 figs., 1951. [Multilithed.]

During 1950 spraying experiments were carried out at East Lansing, Michigan, for the control of cherry leaf spot [*Coccomyces hiemalis*: *R.A.M.*, 29, p. 417; 30, p. 477]. On 14th July spray materials were applied to a plot of five-year-old trees growing under crowded conditions, which appeared uniformly affected by leaf spot although showing little defoliation or yellowing. The percentage defoliations on 20th September on those sprayed with actidione at 5 and 1 p.p.m., Bordeaux (3–5–100), 341 SC plus lime (1½ qt.-½-100), and on the unsprayed were 13, 15, 19, 24, and 93, respectively.

Plot 2, which was sprayed on 22nd July under different epidemiological conditions, consisted of similar trees but with fewer established lesions. The figures for 341 SC plus lime, ortho 406 (2 lb.—100), CR 305 (1½ lb.—100), Tennessee 26-lime (3–3–100), and the unsprayed were 3, 4, 17, 9, and 90 per cent. defoliation, respectively. All the materials used gave good control of leaf spot compared with the unsprayed trees.

Plot 3 consisted of two blocks of nursery yearlings, one of Montmorency and the other of sweet cherry varieties. On 8th July all the trees were sprayed with 4 p.p.m. actidione which killed the fungus in the active lesions, but by 25th August new infections were established throughout the plot. Further sprays were applied on that day, the percentage defoliation on 20th September for 341 SC plus lime being 72, actidione (2 p.p.m.) 16, and Bordeaux 32. The trees sprayed with actidione were outstanding not only for their freedom from leaf spot but for retarded mildew [*Podosphaera*? *oxyacanthae*] development.

Davuidov (P. N.). Применение миколитических бактерий в борьбе с Американской мучнистой росой Крыжовника и некоторыми другими болезнями растений. [The use of mycolytic bacteria for the control of American powdery mildew on Gooseberry and of some other plant diseases.]—Докл. Ленина Акад. сельскохоз. Наук. [*Rep. Lenin Acad. agric. Sci.*], *1951*, 9, pp. 35–38, 1951.

At the Altai Berry Fruit Experiment Station, U.S.S.R., *Sphaerotheca mors-uvae* on gooseberry [*R.A.M.*, 18, p. 39, and next abstract], *S. humuli* on hop [ibid., 9, pp. 487, 744], *Erysiphe polygoni* on nettle, and *S. pannosa* on wild rose [ibid., 17,

p. 771] were sprayed two to three times with a cow manure infusion, consisting of one part manure in three parts water, left to draw for three days and then again diluted with three parts water just before spraying. This treatment resulted in a complete localization of infection with no further development. In laboratory tests, carried out simultaneously as a check, drops of the manure infusion containing mycolytic bacteria were applied to pure cultures of *Sclerotinia libertiana* [*S. sclerotiorum*] and two strains of a *Fusarium* sp. [ibid., 30, p. 561] grown on potato agar in Petri dishes. These drops soon caused the bacteria to spread and destruction of the mycelia began.

About the beginning of August ears of bushy wheat stands at the early stage of wax maturity were sprayed with the same solution. In spite of the belated spraying and dry weather, unfavourable to *Fusarium* development, positive results were obtained and the condition was alleviated. Absolute weight of wheat was 35 gm. for those sprayed with the bacterial solution and 31 gm. for the unsprayed plants, seed germination was 97 and 67 per cent., respectively, and percentage of seeds infected with *Fusarium*, *Cladosporium*, and other mould fungi was 3 to 5 and 35 to 40, respectively.

Further experiments have shown that mycolytic bacteria, obtained from old rotting hay that had overwintered and rotted either on tree leaves or on hot-bed soil, were equally efficacious in controlling powdery mildews. Of the 15 types of soil studied in the laboratory only six, all rich in humus, were found to contain these mycolytic bacteria. A means was discovered of enriching the soil with antagonistic microbes so that lysis of fungi in pure culture took place even with the types of soil not having mycolytic bacteria at first. A layer of damp soil (50 to 60 per cent. humidity) in a covered Petri dish was scattered with spores of *Tilletia tritici* [*T. caries*]. A few days later a silvery white, thin coating of the germinating spores appeared on the surface. Five to seven days later this coating became slimy and brown and was destroyed by bacteria. When earth was added to the mycelium of the fungus, a rapid multiplication of bacteria and hyphal lysis followed. This method proved useful in preparing cultures of mycolytic bacteria in decoctions of potato and fresh hay.

Mycolytic bacteria have been proved in the above experiments to control powdery mildew and other ectotrophic fungal diseases, and it is hoped that it will also be possible to use them against endotrophic diseases.

Kulik (A. A.). **The Gooseberry as raw material for the wine making industry.**—*Vinod. i Vinograd., U.S.S.R., 1949*, 7, pp. 32–33, 1949. [Russian. Abs. in *Plant Breed. Abstr.*, 20, 2, p. 339, 1950.]

Reference is made to several new gooseberry varieties resistant to *Sphaerotheca* [*mors-uvae*: see preceding abstract] bred at the Michurin Horticultural Research Institute, U.S.S.R., by K. D. Sergeeva. Good quality wine could be made from the berries of hybrid families from Oregon × Finik Zelenuy [Green Date], English Yellow × Stambovuy Michurina [Michurin Determinate], Houghton × Finik Zelenuy, Thompson × Zelenuy Butylochnuy [Green Bottle], Zelenuy Butylochnuy × *Ribes grossularia* var. *succirubra*, and Careless × pollen mixture of several *Sphaerotheca*-resistant varieties.

Starr (M. P.), Cardona (C.), & Folsom (D.). **Bacterial fire blight of Raspberry.**—*Phytopathology*, 41, 10, pp. 915–919, 1 fig., 1951.

From Latham red raspberries involved in an outbreak of bacterial blight in central Maine in August, 1947, and notified in the same year in *Plant Dis. Reptr*, 31, p. 324, an organism was isolated in pure culture and shown by inoculation experiments to be responsible for the disease. Its bacteriological features suggest a close relationship with *Erwinia amylovora* [cf. *R.A.M.*, 12, p. 455], but the

raspberry isolates failed to infect apple and vice versa. *E. amylovora* f.sp. *rubi* n. f.sp. is proposed for the raspberry pathogen.

Infection of the stem results in a purplish-black discoloration; of the upper part of the shoot in death, blackening, and curving; of the inflorescences in a purple discoloration and death; and of the leaves in purplish blackening of the rachis, blackening of the veins, and brownish blackening of the adjoining tissue, while stem-girdling at a node leads to the death of the leaf, which remains attached to the stem. The dark lesions on the stem, the adjacent green parts, and the infected leaf veins exude viscous, milky drops, and blisters full of bacteria are formed in the young bark. Circumstantial evidence is adduced for the importance of wet weather in the development of the blight. The detection in the summer of 1950 of blight symptoms first on small, late canes a few inches high and on other shoots 9 to 18 in. high in a planting affected in the previous year suggests the possibility that the pathogen overwintered in the subterranean parts and was spread from the small, late suckers to the aerial organs.

Frazier (N. W.). **New aphid vectors of Strawberry viruses.**—*J. econ. Ent.*, 44, 2, pp. 258–259, 1951.

In connexion with an investigation of the strawberry virus complex in California [*R.A.M.*, 30, p. 619], eight species of aphids were tested at the State Agricultural Experiment Station, Berkeley, for their ability to transmit unidentified viruses producing on indicator plants symptoms largely of the crinkle type. Five of the species proved to be capable of virus transmission, namely, *Amphorophora rubi* (10 out of 61 plants inoculated), *Myzaphis rosarum* (11 out of 30), *Macrosiphum pelargonii* (16 out of 97), *Myzus ornatus* (36 out of 193), and *M. porosus* (12 out of 97). The acquisition feeding period on the source plants ranged from four hours to seven days and the test period on the indicators from four hours to 11 days. None of the five new vectors appeared to be as efficient in virus transmission as the strawberry aphid, *Capitophorus fragariae*. *M. porosus* and *Myzaphis rosarum* were found only on cultivated rose, while the other three were collected on *Fragaria* spp.

Hutchinson (M. T.). **Means of developing resistance to Blueberry stunt disease.**—*Cranberries*, 14, 10, pp. 10, 14, 1950. [Abs. in *Biol. Abstr.*, 25, 4, p. 1121, 1951.]

Studies on the stunt virus disease of blueberry [*Vaccinium* spp.: cf. *R.A.M.*, 29, p. 517; 30, p. 422] indicated that the resistance of the Rancocas variety is due to something within the plant, which is not related to the feeding or living habits of the vector, the sharp-nosed leafhopper [*Scaphytopius*: loc. cit.].

Jenkins (Anna E.) & Watson (Alice F.). **Interceptions of Sphaceloma punicae from foreign sources.**—*Plant Dis. Reptr*, 35, 9, pp. 415–416, 1 fig., 1951. [Multilithed.]

Details are given of further interceptions of *Sphaceloma punicae* on pomegranates from Mexico [*R.A.M.*, 28, p. 608] and two from Italy.

Chandraratna (M. F.) & Nanayakkara (K. D. S. S.). **Cultivated varieties of Banana in Ceylon.**—*Trop. Agriculturist*, 107, 2, pp. 70–91, 3 pl., 1951.

The authors trace the history and probable origin of the banana varieties cultivated in Ceylon, discuss the range of variation within these varieties, each of which is described, and give brief notes on diseases [*R.A.M.*, 29, p. 79] and varietal susceptibility. Hondarawala and Suwandel are the most resistant to Panama

disease (*Fusarium oxysporum* [var. *cubense*: C.M.I. map No. 31]). There is a key to the 29 varieties cultivated in Ceylon.

VERMA (G. S.) & KAMAL (M.). **Rot of Mangifera indica L. caused by Aspergillus.**—*Curr. Sci.*, 20, 3, pp. 68–69, 1 fig., 1951.

Mango fruits in the Lucknow and other districts of India have long been affected by a rot, originating as a yellowing of the base and developing into irregular, hazy, greyish spots, which coalesce into dark brown or black lesions, 1 to 1½ cm. in diameter. The side of the fruit is occasionally involved, but the tip appears to be free from infection. At an advanced stage the mesocarp in the rotted area becomes depressed and soft. When infection occurs at the stalk end the fruits drop prematurely. A transverse section through the diseased portion revealed invasion of the epicarp, mesocarp, and endocarp. The mesocarp, transformed into a pulpy mass, contained hyphae and spores, the former being present in the stalk cells up to about 4 in. from the point of attachment. The rot usually attacks some 25 per cent. of the crop of several varieties, Gola and Safeda being the most susceptible.

Isolations from the infected tissues almost invariably yielded pure cultures of *Aspergillus niger*, an agent of decay in stored mangoes [*R.A.M.*, 28, p. 468], which does not appear to have been previously recorded on orchard fruits. Experiments in which inoculum was applied to the wounded surface of fruit on the tree and covered with sterile paraffin wax resulted in the development of typical lesions.

ZENTMYER (G. A.) & KLOTZ (L. J.). **Fungicides for the control of Avocado fruit rot.**—Abs. in *Phytopathology*, 41, 10, p. 946, 1951.

A severe rot of avocado fruits from plantings on the South Californian coast is caused by *Botryosphaeria ribis* [*R.A.M.*, 20, p. 484]. Entering while the fruits are still on the tree, the fungus develops only when they begin to soften on reaching the market or consumer. The results of four years' spraying experiments have shown that the disease is controllable by two applications of Bordeaux, crag 658 potato fungicide [ibid., 30, p. 437], bioquin 1 [ibid., 30, pp. 25, 312, 454, 567], or parzate. In randomized tests with five replications during 1950–1 the following percentages of rot developed in fruit picked in January and March, respectively: Bordeaux (sprayed 20th September and 1st November) 4 and 10; crag 658 (two applications) 2 and 11; bioquin 1 (two treatments) 4 and 40; crag 658 (one treatment on 20th September) 12 and 38; and unsprayed 62 and 83. In general, crag 658 is the most satisfactory material by reason of its efficiency and the inconspicuous residue. Attempts at the control of the rot by killing the fungus after penetration of the fruits were uniformly unsuccessful.

WATSON (ALICE J.) & JENKINS (ANNA E.). **Interceptions of foreign Sphaceloma perseae of particular significance.**—*Plant Dis. Reptr*, 35, 9, pp. 416–417, 1 fig., 1951. [Multilithed.]

Isolations from lesions of avocado scab (*Sphaceloma perseae*) [*R.A.M.*, 30, p. 434] on fruit intercepted from Mexico have shown that the so-called 'grey spot' is due to profuse sporulation on the surface, typical spots with few acervuli appearing brown.

HARTSUIJKER (K.). **De rol der deeltjesgrootte bij fungiciden.** [The role of particle size in fungicides.]—*Meded. LandbHogeSch. OpzoekSta. Gent*, 16, 2, pp. 279–286, 1951. [English summary.]

The increasing use of low-volume spraying machinery has brought into prominence the relation of particle size to efficiency in fungicides [*R.A.M.*, 30, p. 379], in which connexion the author summarizes the literature on the subject. Recent experience in Holland [cf. ibid., 31, p. 26] fully corroborates the unanimous

conclusion of previous workers as to the higher toxicity, more extensive coverage capacity, and greater tenacity of fungicides with fine as opposed to coarse particles. These observations, enabling better results to be secured in practice with a lower concentration of toxic substances, are specially applicable to the wettable sulphur and copper preparations.

MAAN (W. J.). **Plantenziektenbestrijding met behulp van vliegtuigen.** [Plant disease control with the aid of aircraft.]—*Maandbl. LandbVoorl.*, 8, 3, pp. 104–112, 2 figs., 3 diags, 1951.

The possibilities of plant pest and disease control by means of spraying or dusting from aircraft [*R.A.M.*, 29, p. 573] are discussed under various aspects, such as the advantages and disadvantages of the method compared with mobile ground machinery, the technique of control, experiments performed in Holland, the practice of spraying from aircraft, and economic data. This mode of treatment is gaining ground in Europe, where Great Britain and France each have operating units, while investigations are in progress in Sweden, Denmark, Switzerland, Italy, and Yugoslavia.

HORSFALL (J. G.) & DIMOND (A. E.). **Plant chemotherapy.**—*Trans. N.Y. Acad. Sci.*, Ser. ii, 13, 8, pp. 338–341, 1951.

The authors survey recent developments in plant chemotherapy (defined as a treatment of the host with a compound so that the action occurs inside the host) with full references to the literature, and in particular discuss the modes of chemotherapeutic action, the assaying of chemotherapeutants in the host, and the stability of chemotherapeutants in biological systems.

STAPLEY (J. H.). **A new technique; low-volume spraying of top fruit.**—*Fruit-Grower, 1951*, 2919, pp. 981–982, 2 figs., 1951.

Experiments on low-volume spraying were carried out at two British sites on standard Bramley apple trees 20 ft. high using a low volume, mercury, scab [*Venturia inaequalis*] spray [composition unspecified] plus BHC [benzene hexachloride: *R.A.M.*, 30, p. 539] (16 lb. in 40 to 50 gals. water per acre). Although conditions were favourable for scab development trees on sites 1 and 2 sustained only 22 and 23·5 per cent. scab, respectively, compared with 41 and 42·7 per cent. on those receiving high volume sprays of mercury and sulphur. A comparison this season showed that a low-volume unit sprays two and a half times as many acres in the same number of hours; no phytotoxicity has been observed so far and there is no loss of spray from 'run-off'. However, knowledge of the types and settings of nozzles is necessary to secure the right volume of spray on each leaf and formulations must be chosen with care.

HILLENBRAND (E. F.), SUTHERLAND (W. W.), & HOGSETT (J. N.). **Determination of residual glyoxalidine fungicides on Apples and Cherries.**—*Analyt. Chem.*, 23, 4, pp. 626–629, 1951.

The increasing use of 2-heptadecylglyoxalidine and related compounds as fungicides in the fruit industry [*R.A.M.*, 31, p. 67] necessitated the development of a method for the determination of traces of spray residue on apples and cherries. A satisfactory technique devised at the Carbide and Carbon Chemicals Division, Union Carbide and Carbon Corporation, South Charleston, West Virginia, involves the titration of the glyoxalidines and their hydrolysis products, which are cationic surface-active compounds, with a standard solution of an anionic surface-active agent in the two-phase system, chloroform-water, using methylene blue as an indicator.

Winter (A. G.) & Willeke (Lisel). **Untersuchungen über Antibiotica aus höheren Pflanzen und ihre Bedeutung für die Bodenmikrobiologie und Pflanzensoziologie.** [Studies on antibiotics from higher plants and their significance for soil microbiology and plant sociology.]—*Naturwissenschaften*, 38, 11, pp. 262–264, 1951.

This is a discussion, based on the results of preliminary experiments at the University of Bonn, Germany, of the properties of the powerful antibiotics derived from plants [*R.A.M.*, 30, pp. 115, 482; 31, p. 74], including tulip, *Aucuba japonica*, and myrtle (*Myrtus communis*), and of their potential influence on the ecology and sociology of the microbial population of the rhizosphere [cf. ibid., 28, p. 297; 30, pp. 223, 575, 622].

Frimmel (F.). **Die Praxis der Pflanzenzüchtung.** [The practice of plant breeding.] —159 pp., 13 figs., Berlin, Paul Parey, 1951. DM. 12.

In this useful treatise, intended to serve the needs of geneticists, students, farmers, and gardeners, the author has surveyed the information available in the field of plant breeding [*R.A.M.*, 30, p. 576]. It contains, besides a number of scattered references to the diseases of individual crops, a section (pp. 23–27) explaining the principles of breeding for resistance and their practical application, illustrated by some well-known examples.

Li (F.). **Observations on the spores of fungi in the upper air of Chengtu Plain.**—*Science* (*Sci. Soc. China*), 26, 2, pp. [not known], 1944; 28, 3, pp. 148–154, 1946. [Chinese.]

On 20th February, 3rd May, 5th August, and 11th November, 1941, four flights for collecting spores of fungi in the upper air of the Chengtu Plain, using the slide, test-tube, and Petri dish methods, were carried out at 12 different altitudes ranging from 500 to 20,300 ft. [*R.A.M.*, 28, p. 183; 31, p. 28]. It was established that the number of spores in the air was greater in spring and summer than in autumn and winter and that, except for the 500 ft. altitude, the number and species of spores appear to be greatest at 3,000 to 4,000 ft. The spores of *Alternaria* spp. and *Puccinia* spp., most numerous at all altitudes, were collected even over 20,000 ft., though a plate exposed at 16,000 ft. showed a few small colonies of bacteria and no fungi at all. *Ustilago* spp. and *Penicillium* spp. were also collected. The clouds were found to be heavily charged with fungus spores.

Bortels (H.). **Beziehungen zwischen Witterungsablauf, physikalisch-chemischen Reaktionen, biologischem Geschehen und Sonnenaktivität. Unter besonderer Berücksichtigung einiger mikrobiologischer Versuchsergebnisse.** [Relations between the course of the weather, physico-chemical reactions, biological occurrence, and solar activity. With special reference to some microbiological experimental results.]—*Naturwissenschaften*, 38, 8, pp. 165–176, 4 figs., 11 graphs, 1951.

The author continues to develop his thesis regarding the relations between meteorobiological factors and the occurrence of disease in man and plants [*R.A.M.*, 29, p. 326]. 'Weather radiation', consisting of hard and soft rays, proceeds, at any rate to a great extent, from the sun, the hard rays, probably in association with the particle radiation disturbing terrestrial magnetism, from the solar M-regions, and the soft presumably accompanying wave radiations from sun spots and ultra-radiation, which during the experimental period of 1950 stood in a negative relationship to epiphytotic outbreaks, e.g., of tobacco wildfire (*Pseudomonas tabacum*), as well as to the disturbance of terrestrial magnetism and changes in barometric pressure. The occurrence of disease is interpreted as a consequence of

the alternating influence of soft and hard rays on both macro- and parasitic micro-organisms. The waxing and waning of infectious diseases and epidemics are thus explicable as resultant on temporary shifts in the curves of operation of the rays on host and parasite.

BREDEMANN (G.). **Biochemie und Physiologie des Fluors und der industriellen Fluor-Rauchschäden.** [Biochemistry and physiology of fluorine and of industrial fluorine smoke injury.]—viii+157 pp., Berlin, Akademie-Verlag, 1951. DM. 16. [Abs. in *Ber. wiss. Biol.*, 72, 3–4, p. 233, 1951.]

Fluorine-containing waste gases from manufacturing plants are responsible for marginal discolorations of the leaves of plants in the vicinity [cf. *R.A.M.*, 31, p. 74], while more severe damage is expressed by dark brown to black spots scattered over the entire lamina. The needles of conifers turn red. Proof of the implication of fluorine in the injury is obtainable only by chemical demonstration of an increased content of the element in the plant substance [loc. cit.], for which purpose the author has devised a qualitative method of crystal precipitation as sodium silicofluoride.

HESSAYON (D. G.). **'Double-action' of trichothecin and its production in soil.**—*Nature, Lond.*, 168, 4284, pp. 998–999, 1951.

Studies in the Department of Cryptogamic Botany, University of Manchester, demonstrated that the antibiotic activity of trichothecin [*R.A.M.*, 28, p. 347; 29, p. 631] was unaffected by autoclaving for one hour at 20 lb. per sq. in. pressure on three successive occasions. To test its effect on the growth of the mycelium of *Fusarium oxysporum* var. *cubense*, a standard amount of inoculum was placed on plates of the agar medium recommended by Freeman and Morrison [loc. cit.] and the diameter of the colonies measured after incubation for 48 hours at 25° C. Five ml. of the antibiotic solution were then spread over the surface of each plate which was incubated for a further 18 hours. When 0·00018 to 0·0018 units of trichothecin per ml. were used there was a marked stimulation of mycelial growth but at 0·0018 to 10 units the effect was fungistatic. At 44 units it was wholly fungicidal with swelling and bursting of the hyphal tips.

Shallow layers of sterile garden soil in Petri dishes were inoculated with *Trichothecium roseum*, incubated at 25° for ten days, and triple-autoclaved. The soil was then embedded in 30 ml. agar, left for 20 hours, and inoculated with a standard amount of inoculum. After incubation for four days at 25° there was a 9·6 per cent. reduction in the diameter of the test fungus colony over the soil inoculated with *T. roseum*, compared with growth over non-inoculated soil, and after 18 days a 10·9 per cent. reduction.

WESTON (W. H.). **Progress of research ramifying from the fungi of deterioration.**—*Trans. N.Y. Acad. Sci.*, Ser. ii, 13, 7, pp. 305–308, 1951.

In addition to the main trend of investigation at the Quartermaster General Research Laboratories, [Philadelphia], on the fungi concerned in the deterioration of textiles, equipment, and other essential war service material [*R.A.M.*, 30, p. 483], a second line of approach embraces research on various aspects of the behaviour of these organisms, including long-term survival under conservation conditions [ibid., 29, p. 320], organization and dominance in spores, interactions between various fungi, utilization of natural materials, and hardihood and versatility.

Species of *Pestalotia*, *Curvularia*, and *Helminthosporium* provided interesting information on spore organization and dominance, being remarkable for their structural differentiation and the pattern and sequence of germination of the spore cells.

Two cases of fungal interaction are cited, one between a species of *Blakeslea* and

a *Penicillium* contaminant, in which the latter promoted abundant sporulation by the former; the other involving the parasitization of *Zygorrhynchus* by a *Septonema*-like fungus, which similarly invaded cultures of *Mucor*, *Rhizopus*, *Circinella*, *Cunninghamella*, *Syncephalastrum*, and allied species.

The qualities of hardihood and versatility are exemplified by *Cladosporium herbarum*, which tolerates a wide range of temperature, hydrogen-ion concentration, and chemicals, and is responsible for a noteworthy diversity of destructive activities.

Ames (L. M.). **A new cellulose decomposing fungus.**—*Sydowia*, 5, 1–2, pp. 120–123, 1 pl., 1951.

Schizothecium longicolle n.sp., isolated from a specimen of deteriorating material from Barro Colorado, Canal Zone, Central America, is described and reasons given for the acceptance of *Schizothecium* Corda (1835) instead of *Sordaria*. The loss of strength of cloth samples attacked by *Schizothecium longicolle* denotes its capacity for the utilization of cellulose in its metabolic processes.

Berk (S.) & Teitell (L.). **Effect of fungus growth on the tensile strength of pressure-sensitive electrical insulating tapes.**—*Bull. Amer. Soc. Test. Mat.* 174, pp. 67–71, 4 figs., 1951.

At the Pitman-Dunn Laboratory, Frankford Arsenal, Philadelphia, 23 different types of pressure-sensitive electrical insulating tapes were tested for fungus resistance, using a mixed spore suspension of *Chaetomium globosum*, *Aspergillus niger*, *A. flavus*, *Trichoderma* sp., and *Penicillium luteum* [cf. *R.A.M.*, 31, p. 29]. The cellulose acetate, vinyl, and polyethylene samples supported only slight mould growth [cf. ibid., 29, p. 43], the glass fabric none to heavy, and the paper and cloth very heavy, with resultant drastic reductions in breaking strength. A yellow flat stock paper was treated with four fungicides, including phenyl mercuric saccharinate at 0·84 per cent., which conferred adequate protection against moulds and decreased the loss in breaking strength.

Vicklund (R. E.) & Manowitz (M.). **Mildewing of paints and its prevention.**—*Paint Varn. Prod.* (formerly *Paint Varn. Prod. Mgr*), 31, 2, pp. 8–11, 26, 4 figs., 1951.

The authors' examination of mildewed paints at Fort Sam Houston, Texas, and Fort Belvoir, Virginia, confirmed the results of recent studies in New Jersey (*Paint, Oil & Chem. Rev.*, 111, 16, 1948) and Florida [*R.A.M.*, 30, p. 282] as to the predominance of *Pullularia pullulans*, though species of *Aspergillus* and *Penicillium* were also frequently encountered.

In assays of the relative efficiency of several fungicides for the control of mildew in iron oxide-linseed oil paint [ibid., 26, p. 503; 27, p. 379], *A. oryzae* was used as the test organism [ibid., 27, p. 251], since its reactions to chemical treatment are similar to those of *Pullularia pullulans* and it is more stable and easier to handle under laboratory conditions. On inspection after an incubation period of 7 to 14 days, complete freedom from mildew was registered in the samples treated with 0·5 per cent. copper-8-quinolinolate [ibid., 29, p. 233; 31, p. 29], 6 per cent. salicylanilide [loc. cit.], 2 per cent. copper salt of N-nitrosophenylhydroxydamine, and 1 per cent. selenium diethyldithiocarbamate. A panel painted with a red barn paint containing 2 per cent. copper-8-oxyquinolinolate showed slight evidence of mildew after eight months' exposure in the tropical chamber, whereas the incorporation into a mixed pigment paint of zinc oxide [ibid., 23, pp. 183, 450] in addition to the same amount of copper-8-quinolinolate prevented infection for 18 months under comparable conditions. The use of fungicidal combinations, e.g., copper 8-quinolinolate and tetrachlorophenol has also proved beneficial.

Approaching the problem from another angle, it has been found that, while the use of fungicides in the undercoat is helpful, the critical factor in mildew control is the amount of disinfectant available in the finish coat, more especially in the uppermost layer, where dust collects and permits the gradual development of moulds as the fungicide is dissipated. Thus, a formulation enabling the slow migration of the fungicide to the surface might greatly extend the effective life of a fungicidal paint.

Lilly (V. G.) & Barnett (H. L.). **Physiology of the fungi.**—xii+464 pp., 1 pl., 39 figs., 39 graphs, 6 diags., London, McGraw-Hill Book Co., Ltd., 1951. 64*s*.

In this work [cf. *R.A.M.*, 30, p. 185], intended primarily for advanced college students and mycological research workers, an attempt has been made to bring together and discuss present information in the field of fungal physiology. Chapters, following an introduction, are devoted to culture media, growth, enzymes and enzyme action, essential metallic elements, essential non-metallic elements other than carbon, carbon sources and utilization, hydrogen-ion concentration, vitamins and growth factors, fungi as test organisms, metabolic antagonists, action of fungicides, metabolic products, factors influencing sporulation, spore discharge and dissemination, spore germination, physiology of parasitism and resistance, and physiological variation and inheritance of physiological characters. Each chapter is provided with a summary and a list of references. The book concludes with 12 suggested laboratory exercises (pp. 419–439). Much of the authors' work previously noticed in this *Review* [ibid., 30, p. 503 and next abstract] is incorporated.

Barnett (H. L.) & Lilly (V. G.). **The inhibitory effects of sorbose on fungi.**—*Science*, 114, 2965, pp. 439–440, 1951.

In studies at West Virginia University, Morgantown, an unusual inhibitory effect on the utilization of available sugars, such as glucose, maltose, or sucrose, by sorbose was observed when ten fungi were grown in a basal medium containing a combination of sugars. *Ceratostomella* [*Ceratocystis*] *fimbriata* [*R.A.M.*, 28, p. 637] showed the greatest degree of inhibition; under no condition did it make more than 10 to 15 mg. mycelium (dry weight) in media containing 20 gm. sorbose per l., even in the presence of glucose or maltose. Other fungi making only a trace of growth were *Chaetomium globosum*, *Sphaeropsis malorum* [*Physalospora obtusa*], and *Choanephora cucurbitarum*. In additional, unreported experiments smaller amounts of sorbose in the presence of glucose or maltose caused less inhibition. In the presence of sorbose mycelial production by *Ceratocystis fimbriata*, *P. obtusa*, and *Alternaria solani* was also unaffected by temperatures ranging from 15° to 35° C. *C. fimbriata* showed 77 per cent. and 15 per cent. dead hyphal tips in sorbose and maltose media, respectively.

Baumeister (Gabriele). **Wuchs- und Hemmstoffe in der Knolle und im Kraut gesunder und abbaukranker Kartoffelpflanzen.** [Growth substances and inhibitors in the tuber and tops of healthy and 'degenerate' Potato plants.]—*Planta*, 38, 6, pp. 683–741, 2 diags., 46 graphs, 1951.

In comparative studies at the Botanical Institute, Münster, Westphalia, on healthy and leaf roll virus-infected Ackersegen potato tubers, the former were found to contain more auxins than the latter [*R.A.M.*, 21, p. 94]. One of the inhibitors developing in the tubers of diseased plants was sensitive to hydrogen peroxide and the other resistant to both hydrogen peroxide and hydrochloric acid. The foliage contained one inhibitor sensitive to hydrochloric acid and another resistant to both hydrochloric acid and hydrogen peroxide.

Köhler (E.). **Zum Nachweis von Kartoffelvirosen im Testpflanzenverfahren.** [On the demonstration of Potato viruses in the indicator plant procedure.]—*NachrBl. dtsch. PflSchDienst* (*Braunschw.*), 3, 2, p. 25, 2 figs., 1951.

Not only do the leaves of *Gomphrena globosa* react to inoculation with various strains of potato virus X, but also to tobacco ring spot from potato [*R.A.M.*, 30, p. 484]. At the outset the ring spot lesions closely resemble those of virus X, but later the former may be differentiated by a particularly extensive development of necrotic, bleached zones, and they also expand much more rapidly. In comparative tests on leaves (*a*) left on the plant after inoculation or (*b*) detached and placed in Petri dishes, the symptoms appeared about 24 hours earlier in (*b*), after three to four days at a sufficiently high temperature, but there was no other difference.

Very occasionally in potato there are strains of virus X to which *Solanum demissum* reacts in much the same way as to virus A [ibid., 29, p. 378]. On the particular variety (S) used in the writer's tests, the X and A lesions were more or less clearly differentiable, the development of the former being incomplete and the shape deviating markedly from the circular. *S. demissum* does not react to the ring spot virus, which produces a somewhat conspicuous ring pattern on *Datura stramonium* leaves.

On the basis of these data it is advisable to inoculate potato juice samples simultaneously into young plants of Samsun tobacco and *D. stramonium* or *G. globosa*, as well as into *S. demissum* (strain S) leaves for the differential diagnosis of potato viruses A, X, and Y, and tobacco ring spot.

Rudorf (W.) & Schaper (P.). **Grundlagen und Ergebnisse der Züchtung krautfäuleresistenter Kartoffelsorten.** [Foundations and results of the breeding of blight-resistant Potato varieties.]—*Z. PflZücht.*, 30, 1, pp. 29–88, 12 figs., 1 diag., 1951.

Much of the information embodied in this useful survey of the progress of breeding potatoes for resistance to blight (*Phytophthora infestans*) in Germany [see next abstracts] has already been noticed from other sources [*R.A.M.*, 30, p. 240 *et passim*]. A new aggressive biotype of the fungus which appeared in 1950 at the Scharnhorst (near Hanover) branch of the Max Planck Plant Breeding Institute broke down the resistance maintained by a large number of hybrid clones to races A, B, and C. Thus, out of 22 hybrid clones which had given a highly satisfactory performance in three to four years' trials, only two remained fully resistant in 1950. Of a further 78, consisting for the most part of combined *Solanum demissum* hybrid clones [ibid., 31, p. 78] and complex crosses of various wild species, 20 were fully resistant to the new biotype. Finally, among 1,374 A-clones tested in 1950, 193 (14·1 per cent.) proved completely resistant.

Ross (H.) & Baerecke (M[arie]-L[uise]). **Über die Bedeutung der argentinischen Solanum-Arten simplicifolium, vernei, berthaultii, acaule und einiger Formen von S. andigenum für die Züchtung krankheitsresistenter Kartoffeln.** [On the importance of the Argentine *Solanum* species *simplicifolium*, *vernei*, *berthaultii*, *acaule*, and some forms of *S. andigenum* in the breeding of disease-resistant Potatoes.]—*Z. PflZücht.*, 30, 2, pp. 280–291, 2 figs., 1951.

At the Max Planck Plant Breeding Institute, Voldagsen, West Germany, material from Tucumán, Argentina, of *Solanum simplicifolium*, *S. vernei*, *S. berthaultii*, *S. acaule*, and some forms of *S. andigenum* (24 collections in all) was tested for resistance to potato viruses X^N, X^E [*R.A.M.*, 18, p. 409], Y^N, Y^C [ibid., 27, p. 332; 30, p. 240], and leaf roll [ibid., 30, p. 535], and *Phytophthora* [*infestans*: see preceding and next abstracts]. Some seedlings of *S. simplicifolium* and especially of *S. vernei* did not contract infection by the Y strains either by mechanical inoculation with

sap or through contact or aphid transmission in the field, while X strains were innocuous in sap inoculation tests to the entire populations of the cross *S. acaule* 'Bukasov' × *S. acaule* 'von Rosenstiel'. These reactions probably imply a high degree of intolerance (hypersensitivity), though non-susceptibility is not excluded. *S. berthaultii* manifested the highest degree of leaf roll intolerance hitherto observed among potato species and varieties.

All the collections were susceptible to *P. infestans*, but infection developed very slowly and in a mild form on *S. vernei*, *S. berthaultii*, and *S. andigenum* 'Mesada'.

Schaper (P.). **Die Bedeutung der Inkubationszeit für die Züchtung krautfäuleresistenter Kartoffelsorten.** [The importance of the incubation period in the breeding of blight-resistant Potato varieties.]—*Z. PflZücht.*, 30, 2, pp. 292–299, 1951.

The prolonged incubation period of *Phytophthora infestans* (exceeding by one to two days the normal of three to six) in certain German commercial potato varieties, e.g., Frühmölle, Viola, Allerfrüheste Gelbe, Biene, Mittelfrühe, Condor, Fram, Urtica, Voran, Ackersegen, Optima, Erika, and Falke, renders them particularly suitable as breeding material for the development of resistance to blight. A similar but more pronounced reaction is characteristic of *Solanum tuberosum* subsp. *andigenum* [*S. andigenum*] and certain wild species [see preceding abstracts], the use of which as progenitors in hybridization for field resistance is likewise to be recommended.

A dependable method of inoculation in experiments for the selection of forms with a lengthy incubation period consists in the dipping of leaves, cut immediately before the operation from seedlings in the six- to ten-leaf stage, in an actively motile zoospore suspension and then placing them in moist chambers. Counts made after three to five days will give a reliable index of the degree of resistance of individual plants.

Hüttenbach (H.). **Echter Meltau auf Kartoffeln und Gurken.** [True mildew on Potatoes and Cucumbers.]—*NachrBl. dtsch. PflSchDienst* (*Braunschw.*), 3, 7, pp. 98–100, 4 figs., 1951.

In October, 1950, Ackersegen potato plants in a greenhouse at the Phytopathological Institute, Bonn, Germany, were severely attacked by powdery mildew [*R.A.M.*, 7, p. 534; 29, p. 581]. The infection developed when mildewed cucumber and beet plants were brought into the same house, suggesting the possibility of conidial transmission from them to the potatoes. Measurements of the conidia on leaves of the three hosts were 26·3 to 31·6 by 13·1 to 19·7 μ for potato, 26·3 to 31·6 by 13·1 to 18·5 μ for cucumber, and 31·6 to 50 by 11·3 to 21 μ for beet; thus, there was evidently no question of identity between the potato and beet mildews, but cross-inoculation experiments with conidia from potato on cucumber and vice versa resulted in infection, and the dimensions of the conidia on the inoculated plants corresponded (within the limits of error) to those of the original hosts.

Of the two powdery mildews on cucumber, *Erysiphe cichoracearum* [ibid., 29, p. 346] and *Sphaerotheca fuliginea* [ibid., 16, p. 653], the former is the more common. In the present case infection undoubtedly originated on cucumber, and although the pathogen cannot be definitely identified in the absence of perithecia, it is considered likely to be *E. cichoracearum* [ibid., 30, p. 249; cf. below, p. 148].

Vlitos (A. J.) & Hooker (W. J.). **The influence of sulphur on populations of Streptomyces scabies and other streptomycetes in peat soil.**—*Amer. J. Bot.*, 38, 9, pp. 678–683, 1951.

In laboratory experiments at the Iowa Agricultural Experiment Station, Ames, using the dilution plate technique, populations of *Streptomyces* [*Actinomyces*] spp.

(including *A. scabies*) in peat soils from plots at Crystal Lake and Clear Lake [*R.A.M.*, 30, p. 285] and in raw and burned peat from plots at Armstrong, to all of which sulphur had been applied in the spring of 1949, were less than in comparable untreated soils. In certain cases the populations were reduced before there was any appreciable change in soil pH. Towards the end of the 1949 season both pH level and *Actinomyces* populations were lower in sulphur-treated soil than in untreated. In the above localities where potato scab was a factor the reduction in soil populations of *Actinomyces* spp. following sulphur treatment was accompanied by a decrease in the amount of scab on Cobbler potatoes. Populations were also reduced in burned peat soil where scab was not a factor. Bacterial populations, as estimated on nutrient dextrose agar, were greater in sulphur-treated peat soil in the field. Elemental sulphur on agar in Petri dishes was non-toxic to the vegetative growth of *A. scabies*, but hydrogen sulphide inhibited the growth of a pure culture in closed containers of nutrient dextrose broth. The evolution of this gas from several isolates of fungi, streptomycetes, and bacteria grown in sterile peat soil plus sulphur was demonstrated. *A. scabies* in sterile peat did not produce measurable quantities of hydrogen sulphide following sulphur treatment.

Baldacci (E.), Scotti (T.), & Thalmann (L.). **Ricerche sperimentali sui trattamenti al seme di Riso.** [Experimental researches on treatments of Rice seed.] —*Ric. sci. Ricostruz.*, 20, 1–2, pp. 61–67, 1950. [Abs. in *Biol. Abstr.*, 25, 4, p. 1125, 1951.]

Of a number of organic compounds (benzo- and naphthoquinones, organic mercury materials, thiuramdisulphides, and thiocarbamates) tested on rice seed infected by *Helminthosporium oryzae* [*Ophiobolus miyabeanus*] and *Piricularia oryzae* [cf. *R.A.M.*, 29, p. 530; 30, p. 73], only phygon gave good results, though it greatly decreased germination and growth.

Ishizuka (Y.) & Hayakawa (Y.). **Resistance of Rice plant to the imochi (Rice blast) disease and its relation to the silica and magnesia contents.**—*J. Sci. Soil Manure Japan*, 21, pp. 253–260, 1951. [Japanese, with English summary. Abs. in *Chem. Abstr.*, 45, 22, p. 10321, 1951.]

At the Hokkaido University, Sapporo, Japan, rice plants cultured in a standard nutrient solution, with the addition of (1) magnesium oxide and silicon dioxide, (2) magnesium oxide alone, (3) silicon dioxide alone, and (4) neither compound, were inoculated with *Piricularia oryzae* [*R.A.M.*, 30, p. 539]. Blast developed in a severe form in the absence of silicon dioxide and also in the absence of magnesium oxide, even when the former compound was present, a fact which is explained on the following physiological basis. The leaves of the plants grown in (1) contained much cellular silicon dioxide [cf. ibid., 27, p. 444], the amounts of which in (2), (3), and (4), on the other hand, were negligible. The absence of magnesium oxide from the medium increased the succulence of the plants and delayed maturity, thereby facilitating infection by *P. oryzae* and augmenting the total nitrogen content and the ratio of nitrogen to silicon dioxide; the concentrations of the cell sap, soluble nitrogen, and sugars were lowest in the plants of (1) and rose progressively in those of (2), (3), and (4) in the sequence given.

Van der Meulen (J. G. J.). **Rice improvement by hybridization and results obtained.**—*Landbouw*, 23, 1–3, pp. 17–52, 8 figs., 1951. [Indonesian summary.]

Included in this exhaustive, fully tabulated survey of the history, methods, and progress to date of rice improvement in Indonesia by means of hybridization is a reference to varietal reaction to 'mentek' [potassium deficiency: *R.A.M.*, 30, p. 26 and next abstract]. Several of the so-called '40c-selections', obtained from the population of the cross Tjina × Lati sail (the latter of Indian origin), e.g., Bengawan and Mas, are highly resistant. Among the remaining 81 selections

resistance to the deficiency varies, being most conspicuous in those developed at the Ngale and Singamerta breeding stations, where a shortage of potassium is of regular occurrence.

Ogihara (T.) & Tanikawa (W.). **Characteristics of soil producing potash-deficiency symptoms in the Rice plant. I. II. III.**—*J. Sci. Soil Manure Japan*, 21, pp. 116–119, 1950; 198–202, 301–305, 1951. [Japanese, with English summary. Abs. in *Chem. Abstr.*, 45, 22, p. 10459, 1951.]

In soil tending to induce potash deficiency symptoms in rice [*R.A.M.*, 30, p. 121 and preceding abstract] a correlation was established at the Kyushu Agricultural Experiment Station, Japan, between the potassium oxide content soluble in 0·5 *N* acetic acid and the rapid development of the disorder, but not between the total (determined) or the fixed (calculated) potassium contents of the plants and the external manifestation of the shortage.

In the samples examined the absorption coefficient was higher for potassium than for nitrogen, and the former was less easily replaced by other salts than ammonia.

The potassium and ammonium nitrogen contents of air-dried samples of the potash-deficient and other soils were determined by the addition to 100 gm. soil of 1 mg. equivalent nitrogen and potassium oxide and then 0·1 or 0·01 *N* sodium chloride, calcium chloride, ammonium chloride, or potassium chloride. The ratio of potassium oxide to nitrogen was found to be lower in the potash-deficient than in the other soils. The absorption coefficient ratio between nitrogen and potassium in 36 rice soils in Kyushu averaged 2·2 (1 to 4·4).

Viets (F. G.). **Zinc deficiency of Corn and Beans on newly irrigated soils in central Washington.**—*Agron. J.*, 43, 3, pp. 150–151, 2 figs., 1951.

Maize and beans [*Phaseolus vulgaris*] grown on some of the newly irrigated lands in the Yakima Valley and in the Columbia Basin Project of Washington are stunted and chlorotic. In 1950 spray applications of 0·5 per cent. zinc sulphate to affected maize seedlings about 6 in. high prevented any further development of symptoms [*R.A.M.*, 30, p. 166] and permitted excellent growth as compared with the untreated. The deficiency in beans is characterized by very poor growth, general chlorosis of the upper foliage, browning and necrosis of the older leaves, and greatly reduced yields. Applications of 0·3 per cent. zinc sulphate as a foliar spray to the Red Mexican variety on three farms resulted in a resumption of growth and restoration of the normal green colour in five to six days after treatment. Zinc deficiency is particularly acute where the top soil has been removed in levelling land for irrigation, and is associated with a shallow depth to the horizon of lime accumulation (2 to 6 per cent. calcium carbonate).

McGeorge (W. J.). **Lime-induced chlorosis on western crops.**—*Bett. Crops*, 35, 5, pp. 17–20, 43–46, 5 figs., 1951.

Among the crops suffering from chlorosis in the highly calcareous soils of Arizona [*R.A.M.*, 29, p. 531] are citrus and other orchard fruits, sorghum, Sudan grass, Pinto beans [*Phaseolus vulgaris*], and groundnuts. Comparative chemical analyses of green and chlorotic leaves revealed a deficiency of active iron in the latter. Good results have been obtained, particularly with field crops, by the application of side dressings of a sulphur-manure-iron sulphate mixture.

Warcup (J. H.). **The ecology of soil fungi.**—*Trans. Brit. mycol. Soc.*, 34, 3, pp. 376–399, 8 diags., 1951.

In a study of the influence of soil type and soil horizon on the distribution of fungi in five natural grassland soils at Lakenheath Warren, Suffolk [*R.A.M.*, 30,

p. 580], 148 species of fungi were isolated, the genera most commonly found [cf. ibid., 30, p. 591] being *Penicillium* and *Mortierella*, followed by *Absidia*, *Cephalosporium*, *Fusarium*, *Gliocladium*, *Gliomastix*, *Mucor*, *Thielavia*, *Trichoderma*, and *Zygorrhynchus*. The number of fungal species and colonies in a profile diminished with depth, rate of reduction depending on the depth of the soil and the nature of the soil horizons. Most species occur most abundantly in the surface layers. Distribution differed in the five soils, and two large groups of fungi were distinguishable, (*a*) common in the acid soils, and (*b*) common in the alkali soils. Species of *Penicillium* were especially prevalent in the former.

Both spores and mycelium were present, viable spores being specially encountered in the acid soils. Most of the colonies developed from humus particles.

Reinboldt (Barbara). **Über die Verbreitung einiger niederer Phycomyceten im Erdboden.** [On the distribution of some lower Phycomycetes in the soil.]—*Arch. Mikrobiol.*, 16, 2, pp. 177–200, 1 fig., 2 diags., 6 graphs, 1951.

The phycomycetes isolated at the Institute of Plant Physiology, Göttingen, Germany, from aqueous soil suspensions supplemented by various 'baits' (rye straw and pine pollen in the main series of experiments) [*R.A.M.*, 29, p. 119] consisted for the most part of *Karlingia* (*Rhizophlyctis*) *rosea* [ibid., 24, p. 35], *K.* sp., *Nowakowskiella elegans*, *N. macrospora*, *N. profusa*, a new [unnamed] species of *Phlyctochytrium* differing in various morphological characters from *P. synchytrii* [ibid., 4, p. 106], *Rhizophidium carpophilum*, *R. sphaerocarpum*, *R. sphaerotheca*, and *R. subangulosum*. They were irregularly distributed through the soil, forming well-marked clumps, and their frequency within the rhizosphere of certain higher plants was modified by the stimulatory or inhibitory influences of the latter, which in their turn underwent seasonal fluctuations. *Chelidonium majus* tended to exert a repressive effect and chicory and *Rumex acetosa* a stimulatory one on the growth of the fungi, which fell into three groups according to their degree of sensitivity to the emanations of the rhizosphere.

Dietz (S. M.), Steenland (A. P.), & Horner (C. E.). **Mint rust (Puccinia menthae) epiphytotic in the Northwest.**—Abs. in *Phytopathology*, 41, 10, p. 938, 1951.

An outbreak of mint rust (*Puccinia menthae*) [*R.A.M.*, 25, p. 232; C.M.I. map No. 211] caused 25 per cent. reduction in [peppermint] oil yield in Columbia County, Oregon, in 1949, and by the next year the disease had spread to every mint-growing area in the State. Six bi-weekly applications of 10 per cent. fermate dust between 17th May and 19th July reduced leaf drop and the number of uredosori by 46 and 52 per cent., respectively. However, the advisability of commercial use of the chemical is questionable, since carbon disulphide was present in the oil distilled from the treated plants. The best control [cf. ibid., 28, p. 106] has been obtained by cultural practices, such as complete coverage of infected stubble by autumn ploughing, disking back furrows and bad lands, and early spring applications round the fields of dinitro-*o*-cresol and 2,4-D to eradicate self-sown mint plants.

Baxter (J. W.). **The occurrence of rust on Peppermint in western Ontario.**—*Plant Dis. Reptr*, 35, 9, p. 418, 1951. [Multilithed.]

In July, 1951, light to moderately heavy infection of mint rust (*Puccinia menthae*) [see preceding abstract] was observed on peppermint in western Ontario, Canada.

Le May (D. G.). **The 1950 Hop crop.**—*J. Inst. Brew.*, N.S., 48, 2, pp. 117–119, 1951.

The following references of phytopathological interest occur in this report,

presented at a meeting of the London Section of the Institute of Brewing on 8th January, 1951. The showery weather of August, 1950, necessitated the application of stringent measures in England for the control of hop downy mildew [*Pseudoperonospora humuli*: *R.A.M.*, 28, p. 241]. There was a heavy increase in the incidence of *Verticillium* [*albo-atrum*], and it seems highly probable that the cultivation of the normal English commercial varieties will shortly become impracticable in certain areas, where growers will have to substitute the new resistant selections [ibid., 31, p. 84]. Virus diseases, e.g., mosaic, nettlehead, and split-leaf blotch [loc. cit.], are still threatening and are controllable only by grubbing; areas so affected, however, can be replanted, whereas on those infested by *V. albo-atrum* a minimum period of seven years must elapse before recultivation.

Loh (C. S.). **Sugar Cane breeding in Taiwan.**—*Sugar*, 46, 7, pp. 41–43, 1951.

Included in this interesting account of the history and development of sugar-cane breeding work in Formosa are some references to the pathology of the crop [*R.A.M.*, 30, pp. 344, 543–545]. The modernization of the centuries-old sugar-cane industry was inaugurated by the Japanese in 1896 with a programme of foreign introductions, beginning with Rose Bamboo and Lahaina from Hawaii. The commercial value of Rose Bamboo was rapidly lost through its susceptibility to red rot [*Physalospora tucumanensis*: loc. cit.] and heavy typhoon damage, and in 1920 it was completely superseded by the Javanese P.O.J. 36, P.O.J. 105, and P.O.J. 161. However, the extreme susceptibility of these thin varieties to mosaic virus [loc. cit. and next abstract] led to a great decrease in their cultivation from 1925 onwards, and by 1930 99 per cent. of the crop area was occupied by the barrelled canes, P.O.J. 2725, P.O.J. 2878, and P.O.J. 2883, of which the first-named has been the leading commercial variety ever since. It is resistant to most of the major diseases occurring in Formosa, but began to degenerate in the early thirties, and was replaced after 1940 by F. 108, a progeny of P.O.J. 2725 with a large admixture of Chunnee 'blood'; by 1947 F. 108 occupied 68 per cent. of the total area under the crop; although on the reoccupation of Formosa by China after the second world war it was observed to have suffered severely from an epiphytotic of mosaic causing losses computed at up to 30 per cent. in some districts. Since 1946 the Pingtung Sugar Experiment Station has raised several hundred thousand seedlings each year in the hope of producing a hard cane suited to the prevailing climatic conditions, and in recent progeny tests great promise has been shown by some descendants of P.O.J. 2725, P.O.J. 2967, P.T. 41–1010, P.T.–1114, TA. 5, F. 46, and TA. 15.

King (N. C.). **Methods and results of Sugarcane mosaic resistance and tolerance tests.**—*S. Afr. Sug. J.*, 35, 7, pp. 443, 445, 1951.

This paper, also appearing in *Proc. S. Afr. Sug. Tech. Ass.*, *1951*, presents useful information on the methods employed in South Africa to prevent a recurrence of the damage inflicted prior to 1927 by sugar-cane mosaic virus [*R.A.M.*, 6, p. 54].

The terms 'tolerant', 'resistant', 'susceptible', and 'immune' are defined [cf. ibid., 29, p. 520].

In preliminary trials a 20-ft. line is planted with the test variety with mosaic cane on each side. The area is then planted with maize [ibid., 31, p. 88], the principal host of the vector *Aphis maidis*. Promising material from the preliminary trials is planted out in a properly replicated tolerance trial. In such a trial laid down at the Mount Edgecombe Experimental Station, Natal, in January, 1949, each split plot, 4 by 4 Latin square design, consisted of three lines, 19 ft. long, and 10 three-budded setts were space-planted in each line, so that each subplot comprised 30 and the main plots 60 stools. The subplots were planted with mosaic cane and the main

plots with healthy cane of the varieties Co. 301 [ibid., 28, p. 421], Co. 281 [loc. cit.], N:Co. 291, and N:Co. 310, with guard lines of the same varieties on either side of the main plots. The following final germination counts were obtained. In the plots planted with healthy setts the numbers of healthy and diseased shoots of N:Co. 291 were 51 and 69, respectively; N:Co. 310, 89 and 31; Co. 281, 99 and 21; and Co. 301, 89 and 31; indicating a spread of infection from diseased to healthy cane of 57, 26, 17, and 26 per cent., respectively. In the plots planted with infected material the corresponding numbers were 0 and 120; 7 and 113; 0 and 120; 46 and 73, respectively; and percentage recovery 0, 5, 0, and 39, respectively.

At the harvest in July, 1950, the plots planted with healthy setts produced 100 healthy and 848 diseased sticks of N:Co. 291; of N:Co. 310, 1,017 and 249; Co. 281, 119 and 1,057; and Co. 301, 313 and 1,237, indicating a spread of infection of 89·5, 19·6, 89·8, and 79·8 per cent., respectively. In the plots planted with diseased material the corresponding figures were 65 and 1,065; 81 and 703; 6 and 1,198; and 67 and 1,390, respectively, representing recovery percentages of 5·7, 10·4, 0·5, and 4·6, respectively. In the plots planted with healthy cane N:Co. 291 yielded 46·7 tons of diseased sticks per acre and 4·7 of healthy; N:Co. 310, 7·4 and 45·9, respectively; Co. 281, 21·4 and 2·5; and Co. 301, 47 and 11·5, indicating a spread of infection of 90·7, 13·9, 89·5, and 80·3 per cent., respectively. In the plots planted with mosaic setts the corresponding figures were 49·5 and 2·3 tons; 17·3 and 2·9; 24·7 and 0·1; and 44·6 and 2·5, denoting recovery percentages of 4·5, 14, 0·4 and 5·2, respectively. An analysis of these weights demonstrated that primarily infected Co. 301 gave a significantly smaller yield than healthy planting material secondarily infected to an extent of 80·3 per cent. A similar but more striking result was obtained with N:Co. 310, and it appears that substantial mosaic infection might reduce the output by up to 33·1 tons per acre. The low yield of Co. 281 was entirely due to a very poor stand of small sticks. Throughout the experiment the sucrose content of the diseased canes was significantly higher than that of the healthy.

In applying these results to a commercial undertaking, it should be remembered that a primary infection of nearly 100 per cent. would scarcely ever occur in actual practice. They do, however, demonstrate the potential danger of mosaic; the need for continual roguing cannot be too strongly emphasized. It may be concluded on the basis of these trials that Co. 281 and N:Co. 291 are susceptible but tolerant, with little tendency to recovery from infection. Co. 301 is susceptible but intolerant, and there is a reasonable likelihood of recovery. N:Co. 310 is also intolerant and recovers fairly readily.

The mosaic virus was first detected in Co. 281 in 1943, although the variety had been infected artificially prior to its release in 1933. Presumably the infective principle survived the intervening decade in one of the many susceptible grasses, e.g., *Setaria sulcata*, *Digitaria horizontalis*, and *Sorghum verticilliflorum* [cf. ibid., 29, p. 256]. In this connexion attention is drawn to the possibility that the apparently mild strain of the virus at present existing in Natal may give rise to a virulent one.

Wiehe (P. O.). **Leaf scald and chlorotic streak, two Sugar Cane diseases occurring in British Guiana.**—Lecture to British Guiana Sugar Producers' Association, 27 August, 1951, 33 pp., 1 col. pl., 3 graphs, 2 maps, 1951.

In the first section of this article (pp. 2–27) the author describes briefly the outbreak of sugar-cane leaf scald (*Xanthomonas albilineans*) in British Guiana [*R.A.M.*, 30, p. 489], believed to have been first introduced on P.O.J. 2878 about 1928, giving an account of its distribution and prevalence, particularly on the Demerara west coast and in the Berbice district, the causal organism, and possible control. The symptoms, often masked and therefore difficult to detect, and the mode of spread

of the disease are also described [ibid., 6, p. 120]. Flood irrigation immediately after harvest, rats (*Holochilus sciureus berbicensis* and an unidentified sp.) and hard bark beetles (*Ligyrus ebenus*, *Dyscinetus geminatus*, and *D. bidentatus*) may play an important part in spread under British Guiana conditions. Infection, which is more serious on older ratoon canes than on plant canes, covers 70 per cent. of the area surveyed in 1951. While the chronic phase of the disease is common, a few cases of the acute phase have been recorded on B. 34104, which in a yield test lost 34·5 per cent. cane weight while the Brix figure was reduced by 9·5 per cent. Considering the favourable environmental factors for *X. albilineans*, defective drainage and drought in particular, the disease will remain endemic in the colony until the present varieties are entirely replaced by highly resistant or immune ones. The reaction to leaf scald of commercial cane varieties at present under cultivation is given. P.O.J. 2878, Diamond 10, B. 37161, and B. 41227 are tolerant, and B. 4098 and Co. 421 resistant. In tests with new seedling canes 11 of these varieties proved very susceptible, 12 susceptible, five tolerant, nine appeared to be resistant, though showing symptoms, and 130 were free from the disease. Although these reactions were in close agreement with field behaviour, varieties will still have to be observed over a period of two years before final conclusions can be drawn.

Control lies in the protection of the partially resistant varieties from infection and the replacement of B. 34104. Periodic survey of fields of new varieties, the establishment of nurseries and roguing of diseased stools therein, sterilisation of knives when cuttings are being prepared and the cutter is passed from one field to the next, destruction of stools growing on dam beds when fields are being fallowed, and improvement of environmental conditions are short term measures for improving the situation.

The widespread distribution of chlorotic streak [ibid., 30, p. 544; C.M.I. map No. 29], which became apparent during the leaf scald survey, suggests that the disease has been present in the colony for several years. In May, 1951, symptoms were observed on P.O.J. 2878 [*R.A.M.*, 29, p. 202] in the Nickerie district of Dutch Guiana, and in June, 1951, on the M. 134/32 variety in Trinidad. The symptoms of the disease are described. Chlorosis and streaks are absent from the spindle, the streaks on the second and third leaves are less than 2 in. long, pale yellow or greenish, and there is no chlorosis, while the streaks of leaf scald are 12 in. or more in length and pale yellow to white; chlorosis may be present. On fully developed leaves scald streaks are of uniform width (not exceeding $\frac{1}{8}$ in.) with a white line clearly visible in the centre and are continuous in the leaf sheath, while chlorotic streaks are of irregular width (up to $\frac{3}{16}$ in.) and are not continuous in the leaf sheath; such discontinuous streaks are also present on senescent leaves. Discoloured vascular bundles in the stem are more abundant in leaf scald and the profuse development of buds, not occurring with chlorotic streak, gives rise to etiolated laterals.

With the exception of Co. 421 and D. 14/34, most varieties cultivated in British Guiana appear to be fairly resistant to chlorotic streak in spite of exhibiting symptoms. Varieties of good commercial quality and highly resistant to leaf scald but susceptible to chlorotic streak may have to be cultivated on a large scale; other methods of control, such as roguing in nurseries, hot water treatment of cuttings, and drainage improvement, would then assume an even greater importance.

M[ARTIN]-L[EAKE] (H.). **Leaf scald in British Guiana.**—*Int. Sug. J.*, 53, 636, pp. 332–334, 1951.

This information concerning leaf scald (*Xanthomonas albilineans*) and chlorotic streak of sugar-cane in British Guiana has already been noticed from another source [see preceding abstract].

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Da Camâra (E. de S.). **Catalogus fungorum juresi (serra do Gerês) ad micofloram lusitanicam.** [List of Jerez fungi (Jerez mountains), a contribution to the Portuguese mycoflora.]—*Agron. lusit.*, 12, 1, pp. 89–112, 4 pl., 1950.

Included in this annotated list of 128 fungi collected in the mountains of Jerez, Portugal, are several genera and species new to science, among which may be mentioned *Tuburcinia hederae* n.sp. on ivy (*Hedera helix* var. *canariensis*), *Gibberellulina abietis* n.sp. on branches of *Abies nordmanniana*, *Helminthopeltis almeidaeana* n.gen., n.sp. on *Juniperus communis* var. *nana* [*J. sibirica*] foliage, *Botryodiplodia vitis* n.sp. on vine tendrils, and *Coryneum pirinum* n.sp. on pear (*Pyrus communis* var. *pyraster*).

Guyot (A. L.). **Les Urédinées (ou rouilles des végétaux). II. Uromyces.** [The Uredineae (or plant rusts). II. Uromyces.]—(*Encycl. mycol.*, 15), 331 pp., 44 figs., 28 maps, Paris, Paul Lechevalier, 1951.

This part of the author's valuable monograph [cf. *R.A.M.*, 19, p. 239, and next abstract] deals at length with the systematics, morphology, biology, host range, and geographical distribution of the known species of *Uromyces* parasitic on Liliaceae, Amaryllidaceae, Iridaceae, Chenopodiaceae, Plumbaginaceae, Compositae, Rosaceae, Geraniaceae, Primulaceae, Scrophulariaceae, and Valerianaceae in Europe, western Asia, and north Africa, with revisions of species occurring in other parts of the world [cf. ibid., 27, p. 586].

Guyot (A. L.). **Uredineana. Recueil d'études systématiques et biologiques sur les Urédinées du Globe. Tome III.** [Uredineana. Collection of systematic and biological studies on the Uredinales of the world. Volume III.]—(*Encycl. mycol.*, 16), 482 pp., 59 figs., 1 graph, Paris, Paul Lechevalier, 1951.

This symposium of papers on rusts by various authors includes, among others, one (pp. 5–14) by G. Dupias on *Puccinia symphyti-bromorum* [cf. *R.A.M.*, 16, p. 238], in which the author recognizes a third form, viz., *tuberosi-asperi* n.f. on *Bromus asper*. R. Heim (pp. 15–20) contributes an article on *Pucciniosira*. G. Kuhnholtz-Lordat, P. Bernaux, and J. P. Barry (pp. 54–60) give one on *Puccinia* species with deep sori, and A. L. Guyot devotes three papers to the Uredineae in France [cf. ibid., 25, p. 387; 26, pp. 195, 216; 27, p. 586, and preceding abstract], one on nine new species and two on rusts from south-eastern France. A. L. Guyot, M. Massenot, and A. Saccas (pp. 112–119) deal with the rusts of *Ononis* spp., and (pp. 120–124) with species of *Uromyces* parasitic on *Astragalus* spp. On pp. 141–150 A. L. Guyot, M. Massenot, J. Montégut, and A. Saccas describe *P. avenastri* n.sp. and *P. bromoidis* n.sp. on *Avena bromoides* in the southern French Alps. J. Politis (pp. 151–153) lists the rusts collected by him on the Chalcis Peninsula [Macedonia]. T[scharna] Rayss (pp. 154–221) gives an annotated list of Palestinian rusts [cf. ibid., 18, p. 204]; it includes three new forms and *P. agrostidis* [cf. ibid., 20, p. 596] on *Agrostis verticillata*; *P. arrhenathericola* on *Arrhenatherum palaestinum*; *P. carthami* [cf. ibid., 3, p. 324; 21, p. 405; 29, pp. 124, 534] on *Carthamus glaucus*; *P. chrysanthemi* [C.M.I. map No. 117] on *Chrysanthemum indicum*; *P. gladioli* [cf. *R.A.M.*, 28, p. 575] on *Gladiolus segetum*; *P. graminis* subsp. *media* var. *erikssoni* on *Hordeum murinum*; and *P. g.* subsp. *major* var. *stakmani* on *Avena byzantina*, *A. sativa*, and *Hordeum sativum* subsp. *distichum*; *P. loliina* [cf. ibid., 27, p. 158] on *Lolium rigidum*; *P. menthae* [C.M.I. map No. 211] on *Lycopus europaeus*, *Mentha aquatica*, *M. crispa*, *M. silvestris*, *Micromeria serpyllifolia*, and *Satureja thymbra*; *P. prostii* [cf. *R.A.M.*, 15, p. 371] on *Tulipa sharonensis*; *P. tulipae* [cf. ibid., 13, p. 493] on *T. biflora*; *Gymnosporangium clavariiforme* [cf. ibid., 27, p. 371; 30, p. 163] on *Crataegus azarolus*; *Uromyces*

betae [cf. ibid., 27, p. 114; 28, p. 378] on beet; *U. caryophyllinus* [cf. ibid., 25, p. 186] on *Dianthus caryophyllus*; *U. pisi* [ibid., 26, p. 110] on pea; *U. poae* [cf. ibid., 19, p. 303] on *Poa hackeli*; *U. trifolii-repentis* [cf. ibid., 24, p. 473; 27, p. 114] on *Trifolium fragiferum* and *T. repens*; and *Pileolaria terebinthi* [cf. ibid., 8, p. 339] on *Pistacia palaestina*. T. Arwidsson (pp. 222–243) gives [in German] an annotated list of Swedish rusts. It includes *Chrysomyxa abietis* on *Pinus sylvestris*; *C. ledi* [ibid., 30, p. 202], *C. pyrolatum* (syn. *C. pyrolae*) [loc. cit.], and *C. woronini*, all on *Picea excelsa*; and *Melampsora pinitorqua* on *Pinus sylvestris*, *P. montana*, and poplars. A. L. Guyot also contributes further corrections, additions, and observations supplementary to his monograph on the Uredineae [ibid., 19, p. 239], regional and general bibliographies, and notes.

Pavgi (M. S.) & Thirumalachar (M. J.). **Notes on some Indian Ustilagineae III.** —*Sydowia*, 5, 1–2, pp. 9–12, 1951.

Notes are given on six species of Indian smuts. *Urocystis agropyri* [*R.A.M.*, 28, p. 459], of which *U. poae* [ibid., 26, p. 265; see p. 17 of original] is regarded as a synonym, is recorded on *Poa* sp. from Kashmir. *Tilletia pennisetina* on *Pennisetum hohneckeri* [cf. ibid., 9, p. 342] is a new record for India.

Ling (L.). **Taxonomic notes on Asiatic smuts.—III.**—*Sydowia*, 5, 1–2, pp. 40–48, 1 fig., 1951.

Many smuts of southern Asia [ibid., 29, p. 124] are found through the East Indian Islands to Australia in one direction and also in South Africa; western Asia, including the Near and Middle East, harbours species also occurring in the Mediterranean area and North Africa; while a number of north and central European species are likewise common to the third Asian region, comprising north China [ibid., 28, p. 595], Korea, Japan, and a large part of Asiatic Russia. Notes are given on 18 species collected in Asia, including a new one.

Singer (R.). **The 'Agaricales' (Mushrooms) in modern taxonomy.**—*Lilloa Rev. Bot., Tucumán*, 22, pp. 1–832, 29 pl., 1949 (printed 21st June, 1951).

This comprehensive volume brings together previous work [cf. *R.A.M.*, 23, p. 411; 25, p. 475; 26, pp. 30, 84] and presents a modern classification of the agarics and boleti. A survey of the characters which may serve as bases for their taxonomy is given on pp. 12–107, followed by considerations of geography, ecology, phylogeny, and nomenclature. Keys are given to families, of which 15 are accepted, to subfamilies, tribes, genera, and sometimes to species. Under each genus notes are given on generic characters, development, area, limits, state of knowledge, and practical importance. The author accepts 163 genera, of which 18 belong to the Boletaceae and Strobilomycetaceae.

Hughes (S. J.). **Studies on micro-fungi. XII. Triposporium, Tripospermum, Ceratosporella, and Tetraposporium (gen. nov.).**—*Mycol. Pap., Commonw. mycol. Inst.*, 46, 35 pp., 30 figs., 1951. 10*s.* net.

In this paper [cf. *R.A.M.*, 30, p. 584] *Triposporium elegans* is redescribed and figured, *T. cambrense* is described as new, and the position of 18 published species (with three unnamed) is discussed. *Tripospermum* is a genus of sooty moulds which produce similar star-shaped spores but with four arms and they occur on living plants. A revised diagnosis is given, five species are reviewed, and four new combinations made. *Ceratosporella bicornis* has two-armed conidia. A new genus *Tetraposporium* is proposed for two species, a new one parasitic on *Asterina* and another associated with an alga.

Fitzpatrick (H. M.). **Notes on Corynelia oreophila (Speg.) Starb. and closely related species.**—*Mycologia*, 43, 4, pp. 437–444, 11 figs., 1951.

Descriptive and technical notes are given on four species of *Corynelia* [cf. *R.A.M.*, 22, p. 79], viz., *C. oreophila*, *C. brasiliensis*, *C. portoricensis*, and *C. jamaicensis*, all parasitic on *Podocarpus* spp. and known only from the Western Hemisphere; all are more closely related to each other than to other members of the genus.

Blumer (S.). **Beiträge zur Kenntnis der Erysiphaceen. 2. Mitteilung.** [Contributions to the knowledge of the Erysiphaceae. Note 2.]—*Phytopath. Z.*, 18, 1, pp. 101–110, 2 figs., 1 graph, 1951. [English summary.]

An *Oidium* which developed on sunflowers at the Wädenswil Research Institute, Zürich, in the autumn of 1950, and has also been reported from Holland [*R.A.M.*, 3, p. 315], Yugoslavia [ibid., 6, p. 124], and the Neuchâtel area of Switzerland [ibid., 27, p. 158], was readily transmitted to neighbouring cucumbers and infection is believed to have originated in the latter host. Inoculation experiments with material from cucumber mostly substantiated those of Hammarlund with *Erysiphe polyphaga* [ibid., 25, p. 236], to which the Wädenswil mildew is referred [cf. above, p. 139]. On the other hand, Hammarlund's attribution of the differences in the conidial length of *E. polyphaga* on various plants to the specific influence of the host is not acceptable in the light of the author's preliminary measurements, which rather suggest the intervention of genetic factors.

Erica gracilis is attacked by at least two distinct mildews, *Erysiphe polygala* and *O. ericinum* [loc. cit.], the latter diverging from the former in the size and shape of the conidia and in its greater virulence. The conidia of herbarium material of *O. ericinum* measured 40·1 by 13·7 μ and those of two lots of *E. polyphaga* from cucumber (1950) 30·2 by 17·5 and 27·7 by 15 μ (means of 100 and 200, respectively).

New or uncommon host records for Switzerland include *Podosphaera leucotricha* [ibid., 28, p. 360; C.M.I. map No. 118] on *Malus floribunda*, *P. myrtillina* [*R.A.M.*, 30, p. 394] on *Vaccinium myrtillus*, (?) *Microsphaera alphitoides* [ibid., 28, p. 360] on chestnut, and *Phyllactinia suffulta* [ibid., 28, p. 147] on *Asclepias syriaca*.

Raillo (Mme A. I.). **Pilze der Gattung Fusarium.** [Fungi of the genus *Fusarium*.] —415 pp., 51 pl., Pan-Russian Plant Protection Institute of the Pan-Russian Lenin Academy of Agricultural Sciences, State Publishers, Moscow, 1950. Roubles 13.60. [Abs. in *NachrBl. dtsch. PflSchDienst, Berl.*, N.F., 5, 2, p. 39, 1951.]

This is a review by M. Klemm of the late Mme A. I. Raillo's treatise on the genus *Fusarium*, a previous contribution to which has already been noticed [*R.A.M.*, 16, p. 493]. The results of researches carried out on the genus between the death of the author in 1939 and the publication of the monograph have been embodied in the latter by the editor. The work is divided into three parts, of which the first (pp. 9–133) deals with the morphology, culture, and diagnosis of the individual species. The second part (pp. 134–284) presents a new, simplified system of taxonomy based on the variability of morphological characters and the behaviour on a standard medium of species originating on different substrata and in diverse habitats; a key for the determination of the species; and information on their geographical distribution. The detailed exposition in the text is supplemented by numerous illustrations of the conidial forms in relation to the media and by the portrayal (partly in colour) of the pigmentation of some conidial types. The third part (pp. 286–381) deals with the *Fusarium* diseases of cultivated plants and their control and the parasitization of insects and other fungi by species of the genus. The book concludes with a complete compilation of synonyms and Russian and Latin indexes.

Shaw (C. G.). **New species of the Peronosporaceae.**—*Mycologia*, 43, 4, pp. 445–455, 8 figs., 1951.

Full descriptions are given of *Plasmopara cercidis* n.sp. on leaves of *Cercis canadensis* from Tennessee, *Peronospora jacksonii* n.sp. on leaves of *Mimulus guttatus* from Oregon, and other species.

Thung (T. H.) & Van Der Want (J. P. H.). **Viren en looistoffen.** [Viruses and tannins.]—*Tijdschr. PlZiekt.*, 57, 5, pp. 173–174, 1951. [English summary.]

At the Plant Disease Research Institute, Wageningen, Holland, seven samples of tobacco leaves infected by both the rattle [see above, p. 123] and tobacco mosaic viruses were finely cut and mixed with similarly treated healthy raspberry leaves in the ratio of 10 to 30 gm. and supplemented, respectively, by 4 ml. 40 per cent. nicotine sulphate, 4 gm. aluminium hydroxide, 4 gm. quinine sulphate, 2 gm. lead acetate, 4 gm. hide powder, and 6 gm. skimmed milk powder to ascertain the capacity of these substances to protect the viruses from precipitation by the raspberry leaf tannins [cf. *R.A.M.*, 24, p. 326 and above, p. 121]. The mixtures were ground in a mortar, the sap squeezed through cheesecloth, centrifuged, and the clear supernatants dialysed overnight in running tap water. Identical treatment was applied to controls consisting of (*a*) 10 gm. tobacco leaf infected by both viruses and (*b*) a mixture of 10 gm. infected tobacco and 30 gm. healthy raspberry leaf. Inoculation tests were performed by the standard method on White Burley tobacco and *Nicotiana glutinosa* leaves to determine the rattle and tobacco mosaic virus contents, respectively.

Nicotine sulphate was the only one of the substances tested to confer adequate protection on both viruses from precipitation by the raspberry leaf tannins. At the concentration used, lead acetate precipitated the tobacco mosaic but not the rattle virus, thereby affording a means of separating the two *in vitro*.

Takahashi (W. N.). **A comparison of methods for extracting Tobacco mosaic virus from leaf tissue.**—*Phytopathology*, 41, 10, pp. 903–907, 1951.

Three methods of extracting tobacco mosaic virus from leaf tissue are described and compared, namely, coarse maceration of frozen tissue, fine maceration or homogenization [*R.A.M.*, 30, p. 506] of such tissue, and either of these processes followed by digestion of the residue with the aid of different enzymes [ibid., 24, p. 292]. At the University of California, Berkeley, the maximum yield of 10·18 mg. of virus per gm. fresh weight of tissue was obtained by the last-named procedure, using crop enzymes of snail (*Helix aspera*) [ibid., 30, p. 198] at pH 6. Taking this value as 100 per cent., the efficiency of the other methods tested was rated as follows: coarse maceration 37, homogenization 87, and enzyme digestion with (*a*) commercial trypsin at pH 5 and (*b*) snail liver at pH 6, 93 and 97 per cent., respectively.

Pollard (E.) & Dimond (A. E.). **The effect of primary ionization on Tobacco mosaic virus.**—*Phys. Rev.*, 2nd Ser., 82, 2, p. 302, 1951.

This is an abstract of a paper presented at the Annual Meeting of the American Physical Society held in New York from 1st to 3rd February, 1951.

Preliminary studies have shown that the relatively slow loss of infectivity by the tobacco mosaic virus in the dry state is dependent on temperature; at and below room temperature dryness can be maintained for several days. When bombarded by deuterons in the dry state, the action of radiation is predominantly at the site of primary ionization. The writers studied the effect of varying the deuteron energy and explained their results on the basis that one primary ionization produced anywhere in the virus causes inactivation; hence it is concluded that this particular virus is essentially a single molecule.

Oster (G.). **The isoelectric points of some strains of Tobacco mosaic virus.**—*J. biol. Chem.*, 190, 1, pp. 55–59, 2 graphs, 1951.

At the Rockefeller Institute for Medical Research, Princeton, New Jersey, using an improved turbidimetric method, the author determined as follows the isoelectric points of the seven strains of tobacco mosaic virus analysed by Knight [*R.A.M.*, 27, p. 162]: the ordinary and Holmes's masked strains at pH 3·91, J14 D1 at 4·22, Holmes's rib grass strain at 4·49, the green and yellow aucuba strains [ibid., 30, p. 632] at 4·5 and 4·64, respectively, and cucumber virus 4 [? strain of cucumber green-mottle virus] at 4·9. A correlation was established between the isoelectric points observed and the amino acid content of the strains, the former following in the same sequence as the ratios of the number of basic groups (lysine, histidine, and arginine) to the aspartic acid content of the strains. There was also a rough correlation between the isoelectric points and the rate of movement of the viruses in Turkish tobacco, their position in order of decreasing speed being as listed above, except cucumber green-mottle virus which does not attack this host.

Lucardie (Maria). **Remming van de vermeerdering van Tabaksmozaeïkvirus door en extract van de kernen van enkele Palmsoorten.** [Inhibition of the multiplication of Tobacco mosaic virus by a kernel extract of some species of Palms.]—*Tijdschr. PlZiekt.*, 57, 5, pp. 172–173, 1951. [English summary.]

Using the method described by Gendron in connexion with his experiments on the inhibition of tobacco mosaic virus multiplication by coco-nut milk and copra extract [*R.A.M.*, 29, p. 481], the author performed similar tests at the Plant Disease Research Institute, Wageningen, Holland, with kernel extracts of *Acrocomia totai* and *Elaeis* sp. Spraying the leaves of *Nicotiana glutinosa* plants five to six hours before their inoculation with the virus at a dilution of 1 in 100 resulted in an appreciable reduction of the number of local lesions as compared with the controls sprayed with water. Spraying after inoculation did not inhibit the multiplication of the virus. In *in vitro* tests, however, the mixture of equal parts of *A. totai* extract and a 1 in 50 dilution of the virus produced inactivation of the latter in the course of three to five hours.

Stover (R. H.) & Koch (L. W.). **The epidemiology of blue mold of Tobacco and its relation to the incidence of the disease in Ontario.**—*Sci. Agric.*, 31, 6, pp. 225–252, 3 maps, 4 graphs, 1951.

This is a detailed review of work on the relation of the importance of climatic and other factors to the development and incidence of tobacco blue mould (*Peronospora tabacina*) [*R.A.M.*, 30, p. 631] in various tobacco-growing regions of the United States and Canada. The history of the disease in Canada is traced. A careful study was made of meteorological data for southern Ontario before and after each outbreak of the disease beginning with the first in 1938 [ibid., 17, p. 844]. It was found that during these critical periods in the years 1945–7, inclusive, when the disease appeared early in the season and was epidemic, average temperatures were lower by 16° F. (before) and 8° (after), total sunshine less, and relative humidity higher than in other years. There is evidence that mass quantities of wind-borne inoculum (conidia) from the United States tobacco-growing areas in Kentucky and Ohio, occurring in conjunction with the above-mentioned conditions during the critical stages of seedling growth, were probably responsible at least in 1945 and 1946 for the severe outbreaks in Ontario, and that *P. tabacina* can and does overwinter under Ontario conditions. Evaluation of disease incidence in Kentucky and Ohio in relation to the relevant factors in Ontario during the critical period each season should therefore make possible the issue of useful warnings to Ontario growers for timely and appropriate control measures.

Bakker (Martha). **De verandering van de virulentie van Cladosporium fulvum Cooke tengevolge van het invoeren van nieuwe Tomatenrassen.** [The change of virulence in *Cladosporium fulvum* Cooke in consequence of the introduction of new strains of Tomato.]—*Meded. Direct. Tuinb., Wageningen*, 14, 5, pp. 309–313, 1951.

The studies of Bailey [*R.A.M.*, 28, p. 493] and Langford [ibid., 27, p. 543] concerning the origin of physiologic specialization in tomato leaf mould (*Cladosporium fulvum*) are reviewed and discussed. Opposed to Bailey's theory of racial development through mutation is de Bruyn's interpretation, based on her studies of potato and tomato blight (*Phytophthora infestans*) [ibid., 29, p. 379], of the process as a form of adaptation. Plans are in hand for the study of the problem in connexion with *C. fulvum* in Holland [ibid., 30, p. 3].

Yamada (S.). **New disease of Tomato (Lycopersicon esculentum Mill.) caused by Cercospora sp.**—*Ann. phytopath. Soc. Japan*, 15, 2, pp. 61–66, 2 figs., 1951. [Japanese, with English summary.]

A species of *Cercospora*, recently identified by Dr. Chupp as *C. fuligena* [*R.A.M.*, 17, p. 843], is widespread and destructive on tomatoes in Japan. The symptoms of the disease, for which the common name of '*Cercospora* leaf mould' is proposed, are virtually indistinguishable from those caused by *Cladosporium fulvum*. Morphologically, *Cercospora fuligena* is almost identical with *C. diffusa* [ibid., 24, p. 51], except for the septation of the conidiophores in the former species. The optimum and maximum temperatures for conidial germination of *C. fuligena* are about 26° and 35° C., respectively. Mycelial growth is very scanty on standard culture media, consisting of minute, discrete colonies, with frequent saltation. On tomato plant decoction agar conidial production is reasonably abundant; the optimum temperature for mycelial development apparently ranges from 26° to 28° and the maximum from 34° to 38°. Conidia on tomato leaves in the laboratory remained viable until the following June, but all died after 40 days under humid conditions. In nature, therefore, they may survive the winter and cause primary infection in the next season. The inoculation of tomato seedlings with *C. fuligena* resulted in the development of infection and the same species was reisolated from the foliage. Resistance to *Cercospora* leaf mould was shown by the Dwarf Stone and Marglobe varieties among 35 grown in the field. In spore gemination tests *in vitro* the most effective fungicide was Bordeaux mixture, followed by zerlate and fermate.

Went (Johanna C.). **Verslag van de onderzoekingen over de Iepenziekte en andere boomziekten, uitgevoerd op het Phytopathologisch Laboratorium 'Willie Commelin Scholten' te Baarn in 1950.** [Report of the investigations on the Elm disease and other tree diseases carried out at the Phytopathological Laboratory 'Willie Commelin Scholten', Baarn, during 1950.]—*Meded. Inst. toegep. biol. Onderz. Nat.* 46, 16 pp., 1 graph, 1951. [English summary.]

Of the 417 grafts of the 'Bea Schwarz' elm (*Ulmus carpinifolia* No. 62) tested since 1940 for susceptibility to *Ceratostomella ulmi* [*R.A.M.*, 30, p. 86], 9·8 per cent. contracted mild infection from which all the trees recovered. Of 276 two-year-old grafts of *U. hollandica vegeta* (No. 139) × *U. carpinifolia* (No. 1), 44·4 per cent. became severely diseased, with partial recovery of 32·5 per cent., mostly following inoculation early in the season. As regards resistance to *C. ulmi*, the best of the hybrids are *U. carpinifolia* No. 61 × *U. carpinifolia* No. 1 (No. 276), *U. wallichiana* × *U. carpinifolia* No. 1 (No. 248), and *U. hollandica vegeta* × *U. carpinifolia* No. 28 (No. 148). Nos. 248 and 148 however, reacted positively to *Nectria cinnabarina* [loc. cit.] in two out of ten inoculations.

The *Leptothyrium* disease of spruce [loc. cit.] increases during the autumn and early spring, but the masking of symptoms at the onset of budding prevents further observations on the spread of infection.

TORGESON (D. C.). **The Phytophthora root rots of Chamaecyparis lawsoniana.**—Abs. in *Phytopathology*, 41, 10, p. 944, 1951.

Phytophthora lateralis has already been reported as the agent of a root rot of *Chamaecyparis lawsoniana* in Oregon [*R.A.M.*, 30, p. 132]. During the past two years *P. cinnamomi* has been observed causing a root rot of the same host [ibid., 30, p. 433], the symptoms associated with the two species being identical. A root rot of Irish yew (*Taxus baccata* var. *fastigiata*) is also attributable to *P. cinnamomi* [ibid., 16, p. 73; 24, p. 295]. *P. lateralis* appears to be much more widespread in Oregon than *P. cinnamomi*, though the presence of the latter may be more serious on account of its wider host range [ibid., 30, p. 128]. Inoculation experiments with the Oregon isolate of *P. cinnamomi* on *Rhododendron ponticum*, *Castanea dentata*, and *T. cuspidata* gave positive results.

MOREAU (MIREILLE) & MOREAU (C.). **Une grave affection nouvelle de la forêt française : la maladie de l'encre du Chêne.** [A serious new disease of the French forest: ink disease of Oak.] –*C.R. Acad. Sci., Paris*, 232, 24, pp. 2252–2253, 1951.

Further studies on the destructive oak canker in the Lower Pyrenees showed that species of *Nectria* and *Phoma* [*R.A.M.*, 29, p. 544] are not responsible for the disease, the agent of which was identified as *Phytophthora cinnamomi* [ibid., 30, p. 128]. First observed on chestnut in France [ibid., 31, p. 39] in 1860, the disease since 1882 has been ravaging the forests throughout the south-west. Besides the red oak [*Quercus* sp.], *Q. pedunculata* and *Q. tozza* are also hosts of *P. cinnamomi* [in France].

BAKARCIC (M.). **La cancrosis del Plátano.** [*Platanus* canker.]—*Idia* (formerly *Inform. Direcc. Invest. agríc., B. Aires*), 4, 42–43, pp. 3–4, 1 fig., 1951.

Phytophthora cinnamomi was established by inoculation experiments in February and March, 1951, as the agent of a canker of *Platanus orientalis* in the Delta zone of Argentina [*R.A.M.*, 30, p. 433]. The disease, which is of the chronic type, is characterized by the formation of vertical fissures resulting from vascular necrosis and extending over the entire length of the trunk. Infection appears to originate, generally through an injury, at the base of the trunk or at the junction of the main roots. The usual method of propagation by grafting probably assists the penetration of the mycelium into the host, since the process of cicatrization is very slow. The zoosporangia of *P. cinnamomi* are produced exclusively in water, so that the prevailing conditions in the Delta are doubtless ideal for the development and diffusion of the pathogen.

ARK (P. A.) & SCOTT (C. E.). **Walnut blight : three compounds found effective in prebloom-postbloom spray program.**—*Calif. Agric.*, 5, 3, pp. 7, 14, 4 figs., 1951.

Satisfactory substitutes for Bordeaux mixture (which tends to cause foliar injury) for the control of walnut blight (*Xanthomonas juglandis*) [*R.A.M.*, 30, p. 252] in California, applicable both before and after the blossom, are (1) yellow cuprocide, 2 lb. per 100 gals. water; (2) copper A (tetra-copper-calcium oxychloride), 3 lb.; and (3) 3 per cent. ammoniacal copper at $2\frac{1}{2}$ gals. per 100 gals. The prebloom spray may be applied without serious interference with pollination when about 5 per cent. of the pistillate flowers are open, and the post-bloom should follow about three weeks later. In connexion with a brief description of the symptoms of the blight and its agent, it is mentioned that 2 to 15 per cent. of the

infected buds may harbour the latter until the next season, as shown by tests in Contra Costa County.

PACLT (J.). **Fungus and related diseases of the genus Catalpa (Bignoniaceae).**—*Sydowia*, 5, 1–2, pp. 160–168, 3 figs., 1951.

A list is given of 93 fungi and six other diseases and injuries recorded on *Catalpa*.

ITÔ (K.) & KOBAYASHI (K.). **Physalospora paulowniae sp. nov. causing a die-back of the Paulownia tree and its conidial stage, Macrophoma.**—*Bull. For. exp. Sta., Tokyo*, 49, pp. 79–87, 2 pl., 1951. [Japanese summary.]

Constantly associated on twigs of six-year-old *Paulownia tomentosa* trees killed by a die-back in northern Japan on examination in May, 1950, were the perithecia of *Physalospora paulowniae* n.sp. accompanied by pycnidia of a *Macrophoma*. Inoculation experiments established the weak parasitism of both states and also proved the genetic connexion between them.

P. paulowniae is characterized by scattered globose or subglobose, fuscous perithecia, 237 to 267 μ in diameter, with a very short, papillate ostiole, 13 to 19 μ in width; clavate or fusiform, straight or rarely slightly curved asci, 80 to 109 by 17 to 23 μ, containing eight unicellular, ellipsoid, granular, hyaline ascospores, 21 to 27 by 6 to 11 (mean 24·1 by 8·1) μ, and furnished with non- or rarely uniseptate, filiform paraphyses, 92 to 111 μ long. The solitary or gregarious, globose, subglobose, or oblong-ellipsoid pycnidia, with deep brown walls 21 to 36 μ wide, measure 111 to 172 by 103 to 153 μ; the conidiophores are clavate, 10 to 13 μ in length; and the ellipsoid, granular, hyaline conidia measure 19 to 23 by 5 to 7 (21·1 by 6) μ.

The taxonomy of *P. paulowniae* is discussed in relation to other species of the same genus parasitic on hardwoods, e.g., *P. baccae* on vine [ibid., 3, p. 699; 6, p. 81] and *P. piricola* [on pear: ibid., 14, p. 640], both of which are preceded by a *Macrophoma* state, and *P. juglandis* on walnut (*Ann. mycol., Berl.*, 11, p. 260, 1913). *P. paulowniae* differs from the very similar *P. juglandis* in the dimensions of the perithecia, which are about twice as large in the former as in the latter, and in the greater width of the ascospores.

ITÔ (K.) & KONTANI (S.). **Notes on damping-off and root rot of woody seedlings. (I). Relation between the mycelial growth of causal fungi and the concentration of fungicides. (II). A comparative study of isolates of Rhizoctonia solani with special reference to their parasitism.**—*Rep. For. exp. Sta., Tokyo*, 60, pp. 65–91, 9 pl., 1951. [Japanese, with English summary.]

The minimum concentrations of uspulun inhibiting the growth in pure culture of *Pythium* sp., isolated from damped-off *Paulownia tomentosa* seedlings, *Rhizoctonia* [*Corticium*] *solani* from larch (*Larix kaempferi*) [*L. leptolepis*] seedlings, and *Fusarium* sp. *from Cryptomeria japonica* seedlings near Tokyo, were 0·01 to 0·03, below 0·005, and 0·01 to 0·03 per cent., respectively, the corresponding figures for ceresan being 0·03 to 0·05, 0·005 to 0·01, and 0·05 to 0·08 per cent., respectively, for pyroligneous acid [*R.A.M.*, 11, p. 589] 0·01 to 0·03, 0·05 to 0·08, and 0·05 to 0·08, respectively, and aluminium sulphate [ibid., 19, p. 682] 0·1 to 0·3, 1 to 2, and 2 to 5, respectively. Uspulun did not impair the germination of pine (*Pinus densiflora*) seeds at concentrations below 1 per cent., but pyroligneous acid suppressed it completely even at 0·5 per cent.

From their macroscopic appearance on potato dextrose agar, 43 isolates of *Corticium solani* from various hosts and different parts of Japan were divided into eight groups [cf. ibid., 24, pp. 38, 469, *et passim*]. Larch [ibid., 7, p. 413] yielded the largest number of isolates (15), followed by *Cryptomeria japonica* (7), *Pinus*

thunbergii (6), *Chamaecyparis obtusa* (5), *P. densiflora* (4), and one each from *Abies mayriana* [*A. sachalinensis*], spruce (*Picea glehnii*), *Amorpha fruticosa*, cotton, buckwheat, and *Hibiscus cannabinus* [ibid., 28, p. 65]. The results of inoculation experiments with these isolates on conifer seedlings do not support the conclusions of other workers with regard to the greater virulence of the pathogen on its original host [cf. ibid., 1, p. 203]. On the contrary, its pathogenicity on the group of hosts under observation would seem to be generalized rather than specific. No correlation could be established between pathogenicity and such cultural characters as zonation, profusion of aerial mycelium, colony colour, and size, number, and colour of sclerotia, nor was there any apparent connexion between the degree of resistance to uspulun and the virulence of individual strains.

Findlay (W. P. K.). **A note on the fungi of less common occurrence in houses.**—*Trans. Brit. mycol. Soc.*, 34, 1, pp. 35–37, 1 pl., 1951.

Merulius lacrymans [*R.A.M.*, 30, p. 398] and *Coniophora cerebella* [*C. puteana*: loc. cit.] are between them responsible, probably, for over 95 per cent. of the decay in the internal woodwork of buildings in Great Britain. Much less frequent but relatively common are *Poria vaillantii* [ibid., 18, p. 362], *Paxillus panuoides* [loc. cit.], and *Lentinus lepideus* [ibid., 12, p. 669]. *Lenzites sepiaria* [ibid., 30, p. 352] appears to occur less frequently in Britain than in Central Europe. *M. pinastri* [cf. ibid., 30, p. 132] was recorded once, from buried wood in a cellar and *M. himantioides* [ibid., 17, p. 715] occurs occasionally.

Trametes serialis [ibid., 18, p. 76] has been found occasionally, mostly in a resupinate form. *Poria monticola* [ibid., 30, p. 352] is not uncommon on timber imported from Canada. *P. xantha* [ibid., 18, p. 76] is a principal cause of decay in glasshouses and conservatories. *Phellinus megaloporus* [*Poria megalopora*: ibid., 29, p. 485], first recorded about 20 years ago in Britain [ibid., 16, p. 4], has been found in a dozen or more buildings, always on oak, on which it causes an active, white stringy rot. *Poria medulla-panis* [ibid., 20, p. 140] causes a similar decay. *Fomes ferruginosus* [ibid., 16, p. 4] causes a white stringy rot in oak saturated with moisture. *Polystictus versicolor* [ibid., 30, p. 353] is not uncommon on hardwood sills into which moisture has penetrated, and *Daedalea quercina* [ibid., 16, p. 4] has been found causing a brown cubical rot of oak window sills. *Peniophora gigantea* [ibid., 18, p. 361] often occurs on the sapwood of rafters, but makes no progress in seasoned timber. *F. roseus* [loc. cit.] on at least two occasions has caused brown rot of floor boards. *Daldinia concentrica* [ibid., 22, p. 2] was found twice, fructifying on the underside of Canadian maple flooring. *Ozonium aurantiacum*, the mycelial form of *Coprinus* spp., occasionally appears on structural woodwork. *Asterostroma ochroleucum* usually grows on wood decayed by some other fungus and may fructify on the adjoining brickwork. *M. molluscus* has twice been found fructifying on brick arches in which no timber was visible. A large specimen of *Lycoperdon giganteum* developed on the ground 5 ft. below the floor of a church in Kent.

Varner (R. W.) & Krause (R. L.). **Agar-block and soil-block methods for testing wood preservatives.**—*Industr. Engng Chem.*, 43, 5, pp. 1102–1107, 4 figs., 1951.

At the Grasselli Chemicals Department, E.I. du Pont de Nemours & Co., Inc., Wilmington, Delaware, the authors compared the agar-block and soil-block (modified) methods [*R.A.M.*, 8, p. 618; 10, p. 357; 13, p. 70; 29, p. 2; 30, p. 595, and below, p. 156] of testing wood preservatives, using three chemical formulations, viz., phenyl mercury oleate, pentachlorophenol, and the same two compounds combined, and two lignicolous fungi, *Lenzites trabea* and *Hormiscium gelatinosum* [ibid., 28, p. 574]. Similar relative ratings of equivalent statistical significance and precision were obtained for the three materials by each procedure, the choice of

which, therefore, will depend on the relative facility of running the two tests and the degree of standardization attainable. From these standpoints the agar-block method presented advantages over the soil-block. Phenyl mercury oleate proved to be at least 60 times as effective as pentachlorophenol in preventing the disorganization of sugar pine [*Pinus lambertiana*] blocks by the two fungi used in the tests.

Pascoe (T. A.) & Scheffer (T. C.). **Jack Pine pulpwood deterioration in yard storage.**—*Pulp Pap.* (*Mag.*) *Can.*, 52, 7, pp. 184, 186, 189, 190, 193, 196–197, 4 graphs, 1951.

The results of the authors' investigations on the deterioration of jack pine [*Pinus banksiana*] pulpwood during protracted yard storage in north-central Wisconsin have already been noticed from another source [*R.A.M.*, 30, p. 353].

Gadd (G. O.). **On the microbiological problems of the pulp and paper industries.**—*Paperi ja Puu* (*Paper & Timber*), 33, 3, pp. 49–52, 1 fig., 1951.

At the Research and Testing Institute of the Finnish Pulp and Paper Industries, Helsinki, over 100 species of moulds have been isolated from wet pulp. Among them are *Pullularia pullulans* [*R.A.M.*, 29, p. 325], *Trichoderma* and *Penicillium* spp. (green), and *Cladosporium*, *Cadophora* [*Phialophora*], and *Stemphylium* spp. (dark-coloured). The most common type of rot is the brown stain caused by *Polystictus abietinus* [loc. cit.]; *Stereum sanguinolentum* is responsible for a similar defect, but its growth seems to be slower in mechanical pulp than that of the foregoing; while secondary infection may be introduced by *Coniophora cerebella* [*C. puteana*], *Lenzites sepiaria*, and *Lentinus lepideus*, originating on logs in the timber yard.

There are at present only two practicable methods of combating fungal damage to pulp [cf. preceding abstract], one by raising the dry content of the pulp to 75 per cent., and the other by fungicidal treatment. The former method is open to the objection of impairing the breaking-up properties of the wet pulp. The addition of phenyl mercuric acetate [ibid., 31, p. 74] to the pulp at the rate of 20 to 25 gm. per wet ton, corresponding to a cost of about Kr. 1 (Swedish), should prove fully effective against fungal rots, judging by experiments with the above-mentioned organisms and *Fomes annosus*. With the exception of *C. puteana*, which seemed able to tolerate two to three times as much of the chemical as the others [cf. next abstract], all the species were inhibited by 1 mg. per l., and even at 0·25 mg. their development was noticeably poorer than in the control samples. Phenyl mercuric acetate, however, is not fully reliable against moulds, some of which can tolerate mercury up to economically impracticable concentrations [cf. ibid., 30, p. 337].

Phenyl mercuric acetate has given very promising results in the control of slime of joint fungal and bacterial origin [ibid., 30, p. 426], and was shown to retain its toxicity even after adsorption by the fibres.

Pehrson (S. O.). **Fungicidal effects of culture filtrates of a coliform bacterium-type.**—*Physiol. Plant.*, 2, 2, pp. 149–156, 1949.

Of 25 species of fungi, mostly isolated from wet mechanical pulp, pulpwood, and saw timber, which were tested at the Swedish Forest Products Research Laboratory, Stockholm, for their capacity to develop in the presence of culture filtrates of an unidentified and probably undescribed coliform bacterium occurring in groundwood pulp mills in Finland, Norway, and Sweden [see preceding abstract], *Coniophora cerebella* [*C. puteana*] was the only one able to grow at the highest concentration (1 in 2) of the active broth. A lesser degree of resistance was exhibited by *Ceratostomella* [*Ceratocystis*] *piceae* and *Phialophora richardsiae* [ibid., 19, p. 635],

which made slight growth at a dilution of 1 in 4. None of the other species developed at concentrations higher than 1 in 10, while no growth was made by *Merulius lacrymans* or *Fomes annosus* at concentrations above 1 in 20.

LEUTRITZ (J.). **The destruction of wood by fungi and its prevention—wood preservation.**—*Trans. N.Y. Acad. Sci.*, Ser. ii, 13, 5, pp. 177–181, 1951.

Some valuable information, already noticed in part from other sources in this *Review*, is presented on the fungal decay of wood and its prevention by preservative treatment. The disorganization process is largely dependent on temperature and moisture. It may occur at a temperature range of 10° to 45° C., depending on the fungus concerned, providing the moisture content of the wood exceeds 20 per cent. [cf. *R.A.M.*, 30, p. 552]. Wood exposed to the prevailing ambient relative humidities in the United States contains 12 to 15 per cent. moisture, and rotting takes place when an additional amount is absorbed on account of rain, condensation, humidity above 95 per cent., or contact with ground water.

The first and most successful of the preservatives used for the prevention of decay under exacting service conditions was creosote. Certain fungi are tolerant of this substance, the threshold concentration effective against *Lentinus lepideus* [loc. cit.], for example, being 4 to 5 lb. per cu. ft. of wood, as against 0·07 lb. copper naphthenate in petroleum. Another organism frequently isolated from creosoted timber is *Poria microspora*, which is inhibited by 20 per cent. less creosote than *L. lepideus* but withstands ten times more copper sulphate in Petri dish agar tests. Other instances of threshold concentrations (in lb. per cu. ft.), using the soil block technique [see above, p. 154], are 0·12 for pentachlorophenol in petroleum (*Lenzites trabea*) [ibid., 30, p. 553], 1 for zinc chloride (*P. incrassata* and *P. radiculosa*), 0·7 for acidic chromium, copper, and arsenic (same two fungi), and 0·8 to 1·6 for acidic chromium, zinc, and arsenic (*P. radiculosa*).

INOUE (Y.), NAKAMURA (T.), & NISHIMOTO (K.). **Wood preservatives. I. Sterilizing power of o-cresol-sulfur resin against wood-destroying fungi. III. Dehydrogenating reaction of Pine-root oil with sulfur and the sterilizing action. V. The sterilizing action of Pine-root oil and its chloride.**—*Mokuzai Kenkyu* (*Wood Res.*) 4, pp. 19–23, 1950; 6, pp. 7–19; 7, p. 33–44, 1951. [Abs. in *Chem. Abstr.*, 45, 11, p. 4866; 21, p. 9789, 1951.]

At Kyoto University, Japan, three preparations of *o*-cresol-sulphur resin were made by the addition of 2,1, and 0·5 mol. sulphur chloride to 1 mol. *o*-cresol, and their toxicity to *Schizophyllum commune* and *Polystictus sanguineus* [*R.A.M.*, 29, p. 188] determined by the nutrient agar technique [ibid., 10, p. 217]. The most effective (more so than *o*-cresol itself) was the 0·5:1 preparation, which was fungistatic at 0·05 and fungicidal at 0·08 per cent.

Of the three distillates of pine root oil tested against *P. sanguineus* and *Lentinus lepideus*, cresol oil was the most effective, followed by pine and then by turpentine oil. When treated with 20 per cent. sulphur the maximum antifungal effect was obtained by eight hours' heating with turpentine oil, one hour with cresol, and eight hours with pine oil. When pinene was treated with selenium or oxidized in air in the presence of a manganese catalyst, the maximum degree of sterilization (killing point 0·02 per cent. and complete inhibition at 0·01 per cent.) was obtained.

Of all the fractions of pine root oil, the 211° to 240° exerts the strongest sterilizing action and has the greatest capacity for chlorine absorption, so that its chlorinated product is the most potent. Pinene hydrochloride and pinene pentachloride (five, and ten times as active, respectively, as pinene) are chlorinated at room temperature to produce a 50 to 60 per cent. yield.

Koch (J. E.). **Ist Holzschutz durch Kyanisierung noch zeitgemäss?** [Is wood protection by kyanization still timely?]—*Chemiker-Ztg*, 75, 12, pp. 213–215, 1951. [English, French, and Italian summaries.]

The preservative treatment of wood by kyanization [*R.A.M.*, 30, p. 441] cannot, in the writer's opinion, be any longer upheld in view of the availability of more modern methods. It is true that mercuric chloride confers a high degree of protection, but its zone of penetration is much too shallow, while other serious drawbacks include the fact that it can only be used in aqueous solution and its corrosive action on iron.

Broughall (F. G.). **Creosote oil for timber preservation. Specifications and performance in use.**—*Chem. Tr. J.*, 128, 3343, pp. 1493–1494, 1951.

In this paper, presented at the First Annual Convention of the British Wood Preserving Association, held at Cambridge from 25th to 27th June, 1951, the writer summarizes essential information on the points normally covered in the specifications for creosote standardized in Great Britain (by the British Standards Institution, B.S.S. No. 144, 1926), the United States (American Wood Preservers' Association) [cf. *R.A.M.*, 31, p. 2], and the Continent of Europe, where the Scandinavian specification was prepared and accepted at Copenhagen in 1936 for use in the Scandinavian countries, while the Budapest specification of 1937 is valid for the rest of the Continent. The subject-matter is arranged under the headings of specific gravity and water content, value of distillation test, tar acids content, creosote from gasworks tar, and value of bench tests.

Smith (K. M.). **A latent virus in Sugar-Beets and Mangolds.**—*Nature, Lond.*, 167, 4261, p. 1061, 1 fig., 1951.

A new virus, isolated recently from a steckling mangold, appears to be present in a latent condition in a high percentage of seed beets and mangolds in the British Isles; it was found in samples collected at random in Essex, Cambridge, Lincoln, and Scotland. Sap inoculation of cowpea seedlings resulted in the production of characteristic lesions and revealed differences of virus concentration in the samples. Infective sap from mangold stecklings sometimes induced only one or two lesions in the indicator, while that from beet sometimes destroyed the leaves of the test plant. Although the virus seems to be harmless at present in the beet crop, its presence should nevertheless be regarded as a potential source of danger.

Lipeckaja (A. D.). **Trials with 'phytoncides' for the control of vascular bacteriosis of Cabbage.**—*Sad i Ogorod* (*Orchard and Garden*), *1950*, 1, pp. 51–52, 1950. [Russian. Abs. in *Hort. Abstr.*, 20, 3, p. 230, 1950.]

'Phytoncides', the toxic principles extracted from onion, garlic, and horseradish roots, were compared with formalin for the control of vascular bacteriosis of cabbage [? black rot: *Xanthomonas campestris*: *R.A.M.*, 30, p. 453; C.M.I. map No. 136], which recently caused a loss of 80 per cent. of plants in the Krasnodar district [in U.S.S.R.]. The best results were obtained with garlic extract.

Buryhina (E. K.). **Cabbage phomosis and its control.**—*Sad i Ogorod* (*Orchard and Garden*), *1950*, 1, pp. 52–56, 1950. [Russian. Abs. in *Hort. Abstr.*, 20, 3, p. 230, 1950.]

Infection of cabbage seeds and pods by *Phoma lingam* [see next abstract] is generally severe in wet years in the U.S.S.R. [C.M.I. map No. 73], although first-year plants are infected most when there is insufficient moisture, since weak plants are most susceptible. In laboratory experiments inoculated plants contracted the disease only when infested with the cabbage bug (*Murgantia histrionica*). Garlic

extract [see preceding abstract] lessened infection with only a slight reduction of germination. Wind-borne spores from seed-bearing plants may infect first-year plants.

ARSENJEVA (M. V.). **Rootcrop and Cabbage phomosis.**—*Sad i Ogorod* (*Orchard and Garden*), *1950*, 8, pp. 24–25, 1950. [Abs. in *Hort. Abstr.*, 21, 1, p. 73, 1951.]

A description is given of the symptoms and control of canker of cabbage in U.S.S.R. caused by *Phoma lingam* [see preceding abstract]. In addition to the measures already advised [*R.A.M.*, 24, p. 217; 30, p. 133] spraying seed plants with 1 per cent. Bordeaux mixture before and after flowering is recommended.

STERLING (J. D. E.). **The inheritance of flesh colour and clubroot reaction in Swedes.**—*Sci. Agric.*, 31, 6, pp. 253–268, 1951.

In research studies on the inheritance of flesh colour and reaction to club root (*Plasmodiophora brassicae*) [*R.A.M.*, 31, p. 53] in swede crops at the Dominion Experimental Farm, Nappan, Nova Scotia, two highly resistant S4 plants, A and C, of the white-fleshed variety Danish Giant were chosen as one group of parents. Two other parents, E and F, were selected at random from an open-pollinated crop of the highly susceptible yellow fleshed variety Ditmars Bronze Top, grown in disease-free soil. In 1947 the performance of the parental progenies gave an indication of the homozygosity of the parents for factors determining club root reaction. In 1948 two tests, one in the club root garden and the other in disease-free soil, showed that considerable confidence might be placed in the hypothesis that the parents A and E were differentiated by two major factor pairs for club root reaction, that these genes were equal and additive in their effects, and that susceptibility was partially dominant to resistance. Similarly, two major factor pairs differentiated the parents A and F for club root reaction, the factors of the resistant parent being partially dominant to those of the susceptible parent, and the genes equal and additive in their effect.

The production of yellow flesh colour requires the presence of two gene pairs in the homozygous recessive condition, and it appears that linkage or other associations between flesh colour and club root reaction are not present in the material studied. If such relationships do exist they are of no apparent significance in breeding programmes.

GANTE (T.). **Hernieresistenz bei Weisskohl (1. Mitteilung).** [Club root resistance in White Cabbage (Note 1.)]—*Z. PflZücht.*, 30, 2, pp. 188–197, 6 figs., 1951.

In recent experiments at the Baden (Germany) branch of the Max Planck Plant Breeding Institute to determine the reaction to club root (*Plasmodiophora brassicae*) [*R.A.M.*, 29, p. 205 and preceding abstract] of several white cabbage varieties, the most resistant were Böhmerwald and Bindsachsener, followed by Mühlenviertler A. In these varieties there were a fair number of normal roots, whereas those of the susceptible Braunschweiger, Amager-Winter, and Mühlenviertler F consisted largely of galls. In breeding cabbage for resistance to club root, plants of resistant varieties or the progeny of crosses should be tested in infested soil first in the seed-bed, then after transplanting, and finally in the field. The provision of optimum conditions for infection, desirable at all times, is particularly important in the seed-bed.

SYLVESTER (E. S.) & SIMONS (J. N.). **Relation of plant species inoculated to efficiency of aphids in the transmission of Brassica nigra virus.**—*Phytopathology*, 41, 10, pp. 908–910, 1951.

The results of tests at the University of California, Berkeley, designed to determine the capacity for virus transmission of *Myzus persicae* and *Rhopalosiphum*

pseudobrassicae, which acquired the mustard (*Brassica nigra*) virus [*R.A.M.*, 30, p. 256] from mustard and *B. chinensis*, indicated that *M. persicae* was reasonably efficient in the inoculation of the former species (50 out of 60 plants) but not of the latter, only one out of 60 contracting infection. *R. pseudobrassicae* transmitted the virus to fewer plants of both species but was less selective (11 *B. chinensis* and 18 mustard out of 60 of each). Consequently, comparative efficiency ratings of virus transmission by individual vectors may be misleading, since in the present series, for instance, *M. persicae* would have been rated higher in the tests on mustard and *R. pseudobrassicae* in those on *B. chinensis*. Vector efficiency was not significantly modified by the species of plant used as a source of inoculum. It is essential to consider interactions of this kind between vectors and hosts when assessing the former in relation to virus spread in the field.

ERNOULD (L.). **Les possibilités de lutte contre la jaunisse de la Betterave.** [The possibilities of Beet yellows control.]—*Publ. Inst. belge Amélior. Better.*, 19, 3, pp. 71–138, 2 figs., 1951. [Flemish and English summaries.]

This is a useful, comprehensive survey of the possibilities of beet virus yellows control, based on the author's experience in Belgium [*R.A.M.*, 30, p. 399 and next abstract] and a study of 153 contributions to the relevant literature. *Inter alia*, the author discusses the geographical distribution, symptomatology, and economic importance of the disease and the different races of the virus.

Since 1949 a commission of French and Belgian specialists has been investigating the problems raised by virus yellows along the border of Hainault and Flanders. Of particular interest to Belgian growers are the functions of seed beets and spinach in relation to the disease, virus yellows years, and the assessment of the incidence of infection.

ERNOULD (L.). **La lutte contre la jaunisse par l'anhydride bis-bis diméthyl amino phosphorique. Résultats d'essais préliminaires sur un champ de Betterave sucrière en 1950.** [The control of yellows by bis-bis dimethylamino phosphonous anhydride. Results of preliminary tests on a field of Sugar Beet in 1950.]—*Publ. Inst. belge Amélior. Better.*, 19, 4, pp. 179–189, 1951. [Flemish and English summaries.]

In preliminary tests near Tirlemont, Belgium, the systemic insecticide pestox III (bis-bis dimethylamino phosphonous anhydride) [Pest Control, Ltd.; cf. *R.A.M.*, 31, p. 68], applied at 0·33 or 0·55 per cent. up to four times between 2nd June and 12th July, 1950, reduced the average incidence of virus yellows in sugar beet [see preceding abstract; ibid., 30, p. 306] from 30·7 to 10·2 per cent. at the count taken on 25th July, and from 63·6 to 27·9 per cent. at that on 12th September, with a corresponding increase of 12 per cent. manufactured sugar.

HULL (R.). **Can virus yellows be avoided in 1951?**—*Brit. Sug. Beet Rev.*, 19, 3, pp. 105–109, 2 figs., 1951.

In contrast to 1949, the development of beet virus yellows in Great Britain [*R.A.M.*, 30, p. 306] in 1950 was slow and late. In that year an intensive effort was started to reduce the number of sources from which infection can spread in the spring, beginning with seed crops. More than half the stecklings for the 1951 crop were raised in isolation and the rest were sprayed or grown under cover crops. An inspection in October, 1950, revealed a very satisfactory state of health in the beds [loc. cit.], so that seed crops should play only a minor part in the initiation of the disease in the root crops. The great danger now lies in mangold clamps [ibid., 29, p. 599]. In addition to *Myzus persicae*, another aphid found in mangold clamps is *Hyperomyzus staphyleae*, which is seldom observed on beet foliage and is believed

to be introduced into the clamps on the roots. It can be induced to transmit the virus to healthy plants in the greenhouse. Up to 2,000 winged forms have been trapped daily leaving one small clamp, but at the moment their destination is unknown.

For the past three years the agricultural staff of the British Sugar Corporation have made surveys of mangold clamps in some 150 sample areas distributed throughout the beet-growing districts [ibid., 28, p. 370]. Mangolds are grown on approximately three-quarters of the farms, about three-fifths of which still have the roots on the premises at the beginning of April, representing three clamps in two square miles or so. By the beginning of May this number is roughly halved. During April the virus yellows infection potential, calculated from the number and volume of clamps and degree of infestation, tends to increase. From an examination of the data obtained in relation to the amount of disease, and on theoretical grounds, a considerable reduction in the spread of the virus from mangold clamps may be expected if the total number of infested clamps is reduced below about two per 10 sq. miles. The loss of the clamped mangolds is estimated to be small compared with the potential loss of sugar beet and mangold yields.

WALLACE (G. B.) & WALLACE (MAUD M.). **Bacterial blight of Peas.**—*E. Afr. agric. J.*, 17, 1, pp. 16–18, 5 figs., 1951.

Information is given on a destructive bacterial disease, observed for the first time in April, 1951, in field peas and sweet peas in the Northern Province of Tanganyika. The infective bacteria, now under investigation at the Botany School, Cambridge, have much in common with *Pseudomonas pisi* [*R.A.M.*, 8, p. 628; 29, p. 288]. Spread of the disease in the field, particularly in wet weather, is very rapid. However, the use of certified healthy seed for sowing and precautions against contamination from sacks, handling, or other causes help to control it in clean areas. In endemic areas planting should be restricted to the main growing season and rotation with immune crops would be advisable. Wounding of plants, which encourages infection, should be avoided as much as possible when roguing and weeding. Drainage, wide spacing, weeding, and restricted irrigation are recommended, as these all reduce humidity among the plants. If the disease is at all severe the crop should not be used for seed or leave the farm, and all the contaminated material, including pods, should be destroyed. Seed treatment [ibid., 28, p. 557] is of use for the destruction of superficial contamination only.

Distribution Maps of Plant Diseases.—Maps 217–240. Issued by the Commonwealth Mycological Institute, 1951. 6*s.* 0*d.*

The tenth year's issue of this series of maps showing the world distribution of major crop diseases [*R.A.M.*, 30, p. 176] comprises (No. 217) *Leveillula taurica* on various hosts, (218) *Thielaviopsis basicola* on tobacco, etc., (219) *Sphacelotheca destruens* on millet, etc., (220) *S. sorghi* on sorghum, (221) *Plasmopara viticola* on vine, (222) *Peronospora antirrhini* on *Antirrhinum majus*, (223) *Puccinia prunispinosae* on peach, plum, apricot, almond, cherry, etc., (224) *P. cannae* on *Canna* spp., etc., (225) *P. penniseti* on *Pennisetum* spp., etc., (226) *P. dispersa* on rye, (227) *Diplodia macrospora* on maize, (228) *Ramularia vallisumbrosae* on *Narcissus*, (229) *R. armoraciae* on horse-radish, (230) *R. onobrychidis* on sainfoin, (231) *Sphaceloma arachidis* on groundnut, (232) *S. perseae* on avocado pear, (233) *Spondylocladium atrovirens* on potato, (234) *Sphaceloma ampelinum* [*Elsinoe ampelina*] on vine, (235) *Uromyces ciceris-arietini* on chick pea (*Cicer arietinum*), (236) *U. dolicholi* on pigeon pea, *Dolicholus* spp., (237) *P. polysora* on maize, etc., (238) *Ustilago avenae* on oats, (239) *U. crameri* on *Setaria italica*, and (240) *Fusarium albedinis* on date palm.